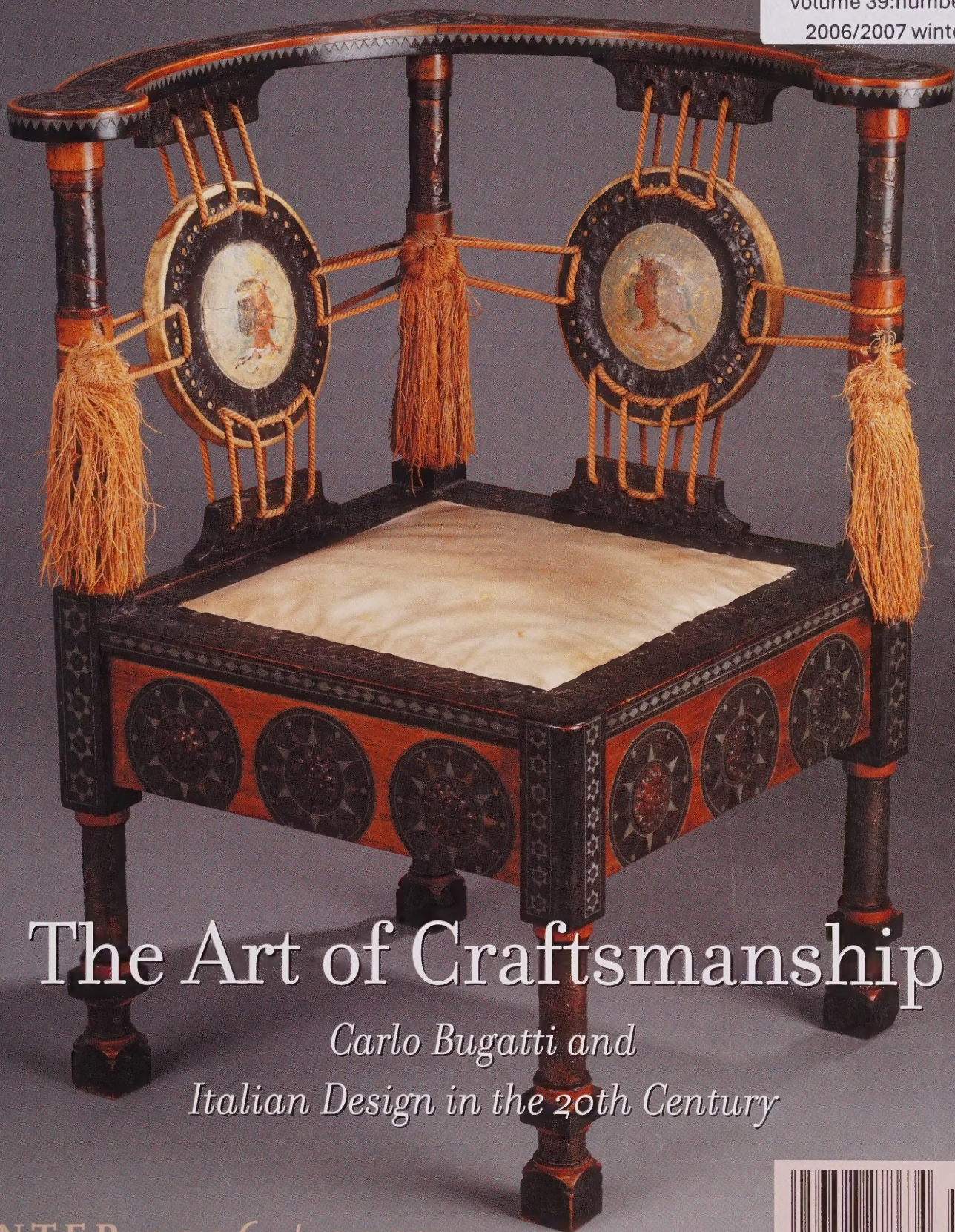


THE LATEST BURGESS SHALE FINDINGS | HISTORY OF SMOKING

ROTUNDA

THE MAGAZINE OF THE ROYAL ONTARIO MUSEUM

volume 39: number 2
2006/2007 winter



The Art of Craftsmanship

*Carlo Bugatti and
Italian Design in the 20th Century*

WINTER 2006 / 2007

DISPLAY UNTIL FEBRUARY 17, 2007 \$4.75



Masters
Gallery Ltd



ROCKY MOUNTAIN SKETCH • 1927 • *Oil on board* • 12" x 15" • LAWREN HARRIS

CELEBRATING 30 YEARS

1976 – 2006

Masters Gallery Ltd.

2115 – 4th Street SW Calgary, Alberta T2S 1W8

(403) 245-2064 Hours: Tuesday – Saturday 10 AM – 5:30 PM

www.mastersgalleryltd.com

C O N T E N T S

Volume 39, Number 2, Winter 2006 / 2007

FEATURES

12 Carlo Bugatti and the Art of Craftsmanship

Balancing traditional artistry with the experimentalism of modernity, artist-craftsman Carlo Bugatti's work provided a generative spring of Italian design throughout the 20th century.

By Michelangelo Sabatino

20 On the Trail of a Phantom Fossil

The identity of a mystery fossil—a single perplexing specimen discovered almost a century ago in Canada's famed Burgess Shale—is finally revealed.

By Jean-Bernard Caron and Dave Rudkin

30 The Big Smoke

It inspired a fatwa in the 1600s and, in more recent times, legions of moviegoers keen to emulate Hollywood glamour. Smoking can be traced back for centuries to far-flung lands.

By Ed Keall

DEPARTMENTS

4 Explorations

Top-notch triceratops; Vietnamese plant eaters

7 Backyard Biodiversity

Bringing back Lake Ontario's Atlantic Salmon: 21st-century technology tries to correct 19th-century mistakes. By Mary Burrigge and Oliver Haddrath

39 Libris

Seas, Islands, Stars. By Glen Ellis

41 Conservation Notes

Restoring the ROM's Fuhrlohg/Beck Piano: Made by a cabinetmaker to the Prince of Wales, this remarkable piece of furniture embodies the best in instrument making and fine marquetry. By Greg Kelley

45 PaleoScene

Cracking the Case: Curious structures once thought to be fossils of ancient worms have an origin that lies beneath the mud. By Dave Rudkin

48 From the Archives

Year-End Party: 'Twas the season in the Old Far Eastern Library. By Jack Howard

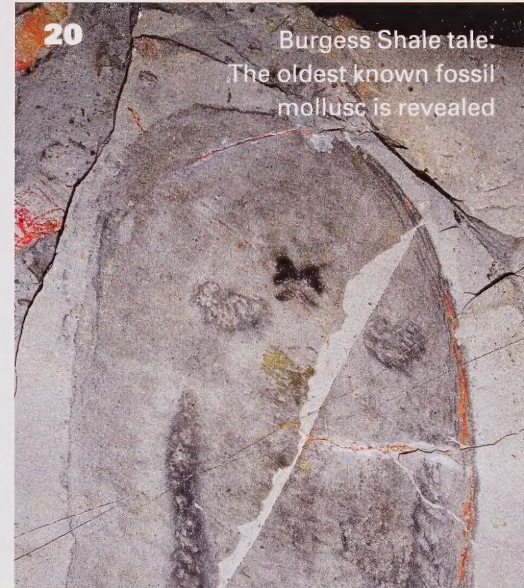
12 Bugatti design: Tradition meets the 20th century

© ESTATE OF CARLO BUGATTI / SODRAC (2006)



20

Burgess Shale tale:
The oldest known fossil
mollusc is revealed



30

Smoke signals: Tracing
the history of taking a drag



ROTUNDA

EDITOR

Lee-Anne Jack

DESIGN AND PRODUCTION

Peter Enneson Design Inc.

CONSULTING EDITOR

Anna Kohn

COPY EDITOR

Andrea Gallagher Ellis

CONTRIBUTING EDITORS

Cathy Ayley, Mary Burrridge,

Glen Ellis, Mark Engstrom,

Peter Kaellgren, Dave Rudkin,

Kevin Seymour, Janet Waddington,

Marianne Webb

ADVERTISING SALES

Colin Hennigar

416.586.5546

EDITORIAL AND MARKETING OFFICES

Rotunda, the magazine of the
Royal Ontario Museum, 100 Queen's
Park, Toronto, Ontario M5S 2C6,
or telephone 416.586.5585,
e-mail lee-anne@rom.on.ca
ROM Web site: www.rom.on.ca

Published three times per year by the
Royal Ontario Museum. © The Royal On-
tario Museum, 2006. Printed and bound
in Canada. Indexed in the Canadian Pe-
riodical Index and the Canadian Maga-
zine Index and available on-line in the
Canadian Business & Current Affairs
Database ISSN 0035-8495. Canadian
Publications Agreement # 40068986.

Return undeliverable Canadian addresses to
Membership Department, 100 Queen's Park,
Toronto, Ontario M5S 2C6

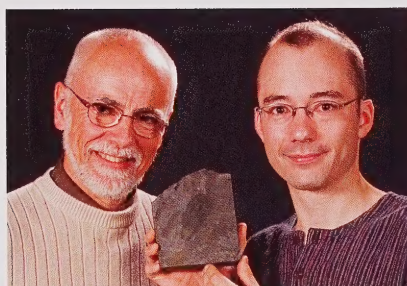
SUBSCRIPTIONS & SINGLE COPY SALES

Subscriptions cost \$15 (3 issues) including
GST, outside Canada add \$7 for postage
and handling; single copies cost \$4.75 plus
GST. All circulation and subscription in-
quiries should be addressed to *Rotunda*,
Royal Ontario Museum, 100 Queen's Park,
Toronto, Ontario M5S 2C6. Phone: 416.
586.5546, Fax: 416.586.5649

PUBLISHED BY

THE ROYAL ONTARIO MUSEUM GOVERNORS
THROUGH THE GENEROSITY OF
THE LOUISE HAWLEY STONE
CHARITABLE TRUST.

CONTRIBUTORS



Dave Rudkin

*Invertebrate Paleontology Section,
ROM Department of Natural History*

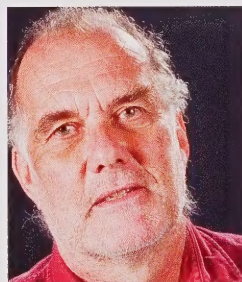
DAVE RUDKIN ("Searching for a
Phantom Fossil"), left, is assis-
tant curator, Invertebrate Paleontol-
ogy, at the ROM. He began working on
the Burgess Shale in 1975 during the
ROM's first field expedition to the
main site. After developing a keen in-
terest in the study of fossil arthro-

pods, especially trilobites, Dave shift-
ed his primary research pursuits to
the Palaeozoic rocks of the remote
Hudson Bay Lowlands in Ontario,
Manitoba, and Nunavut. But he re-
mains infected by the Burgess Shale
bug, and has returned to the site six
times over the last 25 years.

Jean-Bernard Caron

*Invertebrate Paleontology Section,
ROM Department of Natural History*

JEAN-BERNARD CARON ("Search-
ing for a Phantom Fossil"), right,
joined the ROM in January 2006 as
associate curator in Invertebrate
Paleontology. He did his MSc and PhD
on the Burgess Shale, where he began
work in 1998 as a volunteer.



Ed Keall

*Near Eastern and Asian Civilizations
Section, ROM Department of World Cultures*

AT UNIVERSITY in England, Ed
Keall ("The Big Smoke") studied
Latin and Greek literature. In 1962, as
an adventure, he joined an expedition
to Iran, where he was seduced by the
scale of the Middle East, both its geo-
graphical dimensions and the breadth
of its historical past. He joined the ROM
in 1971 to develop the Iranian connec-
tion. In 1979, after Iran closed its doors
to outsiders, Ed transferred his re-
search focus to Yemen, where he still
directs the ROM's Canadian Archaeo-
logical Mission. The main focus of his
research is the historical city of Zabid
on the Red Sea littoral.



Michelangelo Sabatino

University of Houston

TRAINED AS AN ARCHITECT and
architectural historian in Venice
and Toronto, Michelangelo Sabatino
("Carlo Bugatti and the Art of Crafts-
manship"), PhD, is assistant professor
at the Gerald D. Hines College of Archi-
tecture, University of Houston. His re-
search and teaching interests focus on
late 19th- and 20th-century European
and North American architecture, ur-
banism, and design. He has published
extensively, and has received fellow-
ships and grants from the Graham
Foundation for Advanced Studies in
Fine Arts, the Georgia O'Keefe Re-
search Museum, and the Wolfsonian-
FIU, among others.

ROM MESSAGE

DANIEL LIBESKIND was walking through the construction site of the Michael Lee-Chin Crystal recently, pondering this, declaiming that, proposing something, murmuring—as is his wont. Then he waved me over to a corner tucked between the Crystal and the 1931 Centre Block.

"Look what's happening here," he said. "Something special. I can't quite put my finger on it."

Daniel Libeskind's architecture is intensely personal—an artist's vision rather than the expression of a dominant social consensus, such as the Bauhaus or International Style, which defined the 20th century. In fact, the International Style was ideological in its basis—economical, spare, unadorned, practical—an industrial ideal hostile to overt emotional or psychological purposes.

Modernist houses became "machines for living," and public buildings were often judged by how much floor space could be enclosed with minimum structure. The best of these buildings were enormously graceful—such as the TD Centre in Toronto. And this style retains its beauty under the best current practitioners, who add luxurious materials and effects to its rigorous form in the simple name of beauty.

But Mr. Libeskind, like Frank Gehry, is coming from somewhere else. He is coming from somewhere inside—or many "wheres" inside, as an artist does. His purposes go far beyond the utilitarian, emerging from a singular intellect, weaving into psychology and emotion, and then bending this composite creation to a vision and program.

When you recognize elements of his style shared in various projects around the world, they emanate from the fact of his individuality, rather than the prescriptions of a "school."

His works stand alone.

But at the ROM they are not entirely alone. From the beginning, Daniel Libeskind had to deal with a program that included retrieval of our heritage buildings intimately juxtaposed with the creation of an entirely new vision in architecture. In fact, the Crystal nestles

**YOU FIND YOURSELF
PERCHED IN THESE
SURPRISING SPOTS ON
BRIDGES, OR PEERING INTO
THEM THROUGH WALLS OF
GLASS AT STRANGE PLACES,
AND YOU SAY, "LOOK WHAT'S
HAPPENING HERE:
SOMETHING SPECIAL."**

between the northern arms of the 1914 and 1931 wings, even as it soars out over Bloor Street on its own. In Toronto, Daniel Libeskind's art will always be physically part of something else.

"Look what's happening here," he said. "Something special. I can't quite put my finger on it."

It was an interstitial space—an intriguing space between the old building and the new. As we talked, I searched for a metaphor: Take two individuals—Jason and Samantha. Say they marry—a third factor emerges called "them"—the relationship. The relationship has a life and identity all its own.

Among the most gratifying creations in Renaissance ROM is the relationship between the heritage buildings and the Michael Lee-Chin Crystal—the third factor in Daniel

Libeskind's brilliant answer to the challenge of building anew.

It shows up most dramatically in the Hyacinth Gloria Chen Crystal Court—the generous atrium separating the Crystal from the Centre Block in the middle of the ROM. This space is powerfully defined by both players—the old and the new—creating a sensual and intellectual fact unique in the world.

But it shows up most compellingly in the numerous crannies, canyons, and cliff-sides that appear within the heritage wings where the extreme angles of the Crystal structure meet the right angles of the older buildings to the east and west. You find yourself perched in these surprising spots on bridges, or peering into them through walls of glass at strange places, and you say, "Look what's happening here: something special."

It would be more accurate, perhaps, to say, "Feel what's happening here." Because, as we noted above, Daniel Libeskind's

architecture is not confined to intellectual stimulations. Whether you are in the "relationship spaces" or within the Crystal volumes themselves—the Spirit House, the galleries, the shops—his architecture speaks strongly to the emotions and the id as well. It is capable—as the Bauhaus is not—of carrying memory and symbols, probing fears, and opening eyes to a new face of beauty.

Today, a great museum holds its collections up to the light of contemporary culture and science so as to better understand and appreciate both the past and the present. The ROM's programming will do this with conspicuous new energy as we complete Renaissance ROM. And the architecture in which it will occur will do the same.

William Thorsell is director and Chief Executive Officer at the ROM.

E X P L O R A



Triceratops braincase.

Top-notch

Horned favourite

Triceratops

now on view

EVERY CHILD KNOWS the name *Triceratops*, but this famous dinosaur has never been on display at the ROM. Until very recently, the only real material in the ROM collections of this largest of the North American horned dinosaurs consisted of a foot and a few miscellaneous bones collected near Eastend, Saskatchewan, in 1939.

To rectify this situation, the ROM had intended to purchase a cast of a large *Triceratops* skull for the new dinosaur gallery, and space for it had been set aside on the gallery plan. It was to be placed next to the ROM's cast *T. rex* skeleton, a species with which it co-existed during the Late Cretaceous. Imagine our surprise when a real *Triceratops* skull

was recently offered to us for sale! Although not the largest skull of *Triceratops horridus* known, this new skull is one of the best preserved. After assuring ourselves that it was collected legally and was indeed a very good specimen, once again the generous support of the Louise Hawley Stone Charitable Trust enabled us to clinch the deal.

The new arrival will be temporarily displayed on the first floor. It will be transferred into the new Jim and Louise Temerty Gallery of the Age of Dinosaurs when it opens in 2007. It was officially unveiled in its present location by Premier McGuinty on October 19, 2006.

—Kevin Seymour



M22876

Holey Aroids

Insects make their rounds in Vietnam

MOST PLANT-FEEDING INSECTS are picky eaters. Only certain species are attacked and only certain parts of the plant are eaten. Plants, despite their sedentary nature, don't just sit there and take it. They have evolved an impressive array of chemical and mechanical defences to deter herbivores. One of the most effective of these is latex, a milky sap that coagulates on exposure to air. Produced by a variety of plants, most commonly by milkweeds and most notoriously by opium poppies, latex deters many generalist feeders. But some insects are specialized to feed on latex-producing plants, which they manipulate to avoid the defensive secretions. These provide excellent examples of an "evolutionary arms race" between plants and insects. A plant species comes up with a defence, and a herbivore evolves a way to get around this, *ad infinitum*.

A novel insect-plant interaction was recently discovered in Vietnam. The first clue was the discovery of leaves of giant

elephant ear plants (*Alocasia*, a type of aroid) riddled with circular holes. These plants, relatives of the dieffenbachias, philodendrons, and peace lilies that are commonly kept as houseplants, can have leaves approaching 4.5 m (almost 15 feet) in length. Nocturnal observations revealed that the holes were made by adult leaf beetles (*Aplosomyx*) feeding on the plants. Why the circular holes? A closer examination of their behaviour showed that the beetles cut circular "trenches" with their mouthparts in the undersurface of the leaves before feeding preferentially on the circumscribed leaf tissue. The trenches cut through the laticifers—specialized cells that transport latex—and the latex oozes from the leaf. This greatly reduces the amount of latex the beetle has to cope with when feeding on the isolated leaf tissue. The beetles consume virtually all of the enclosed plant tissue, leaving almost perfectly round holes in the leaves.

—Chris Darling

Sentry Select

Capital Corp.



Angelo Morbelli,
Painting, *The Rice Field*, 1901.
Private Collection.

Sentry Select is
proud to be
the fall sponsor of the
Royal Ontario Museum
and the presenting
sponsor of the exhibition
*Italian Arts & Design:
The 20th Century.*

Building Partnerships™

Sentry Select is one of the fastest-growing wealth management companies in Canada. We offer a diverse range of innovative investments that draw from many of our areas of expertise, including income trusts, oil and gas, and commodities. To find out how Sentry Select investments can complement your portfolio, contact your financial advisor or visit www.sentryselect.com.

BACKYARD BIODIVERSITY

BRINGING BACK LAKE ONTARIO'S ATLANTIC SALMON

For millennia, Atlantic salmon thrived in Lake Ontario's cool, clean waters and tributary streams but were extirpated from the lake by 1900. Now, 21st-century technology tries to correct 19th-century mistakes.



Spearing Salmon by Torchlight, by Paul Kane.

LONG BEFORE the first Europeans arrived in the Lake Ontario region, the Atlantic salmon was an important part of the lake's fish community and a significant component in the lives and culture of Ontario's indigenous peoples. The fish was also a top predator, playing a key role in the health of Lake Ontario's ecosystem. But in little more than 200 years of European settlement, the Atlantic salmon was wiped out of Lake Ontario.

The tale of its disappearance is one of white man's greed and carelessness. Consider that in 1832 the species was so

abundant that in a single night two people in a canoe on the Credit River, using only a torch and a spear, could kill enough salmon to fill eight to ten barrels holding 90kg (200 pounds) each. Farms were bought and settle-

MARY BURRIDGE & OLIVER HADDRATH

ment homes were built from the sale of salmon. In November 1793, Elizabeth Simcoe, wife of John Graves Simcoe,

the first Lieutenant Governor of Upper Canada, wrote in her diary that quantities of salmon were speared in the Don River near where they would build Castle Frank, their summer residence.

The fish's great abundance and its appetizing and nutritious qualities made the Atlantic salmon critical to survival for indigenous peoples and early settlers in the region. Unfortunately, its fate was sealed. The last recorded catch was in 1898 by an angler at a place then called "Scarborough Beach." The Atlantic salmon wasn't alone in its fate; some North American species became extinct,

ROM 2005 5138.1

IMPORTS FROM RHODES



BRACELET AND EARRINGS

FROM EGYPTIAN GLASS BEADS, 7TH CENTURY BCE

Authentic
Reproductions
from
the ROM's
Own Collections

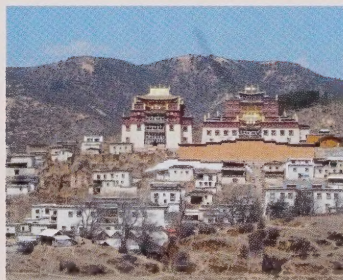
VISIT THE ROM
REPRODUCTIONS
SHOP ON THE
LOWER LEVEL BY
THE TOTEM POLE.

Royal Ontario Museum
416.586.5896
www.rom.on.ca
(click on Plan Your Visit)

NORTH INDIA JAN. 23–FEB. 5 2007 • **TANZANIA FAMILY SAFARI** MAR. 10–MAR. 22 2007

TRAVEL WITH THE ROM

LET OUR EXPERTS BE YOUR GUIDES!



SEE DATES AND DETAILS IN ROM MEMBERS' NEWS



ROMtravel

For further information or a brochure, contact ROMtravel: 416.586.8034 / travel@rom.on.ca
or visit our website at www.rom.on.ca/programs/rom_travel

YUNNAN MAY 8–MAY 24 2007 • **MADAGASCAR** OCT. 19–NOV. 4 2007

including the great auk, by 1844, and the passenger pigeon, by 1900.

So what could have caused the demise of a species that was once so plentiful? Certainly greed was a big part of the problem. But as is so often the case, there was a combination of factors. In the late 1700s, gristmills and sawmills sprang up along many southern Ontario rivers to produce flour and lumber, and the dams that provided their power blocked the salmon from migrating to their spawning grounds. By the mid 1800s, there were 87 mills on the Credit River, 60 on the Humber River, including the "Old Mill," and 45 on the Ganaraska River, to name a few. By preventing the salmon from reaching the rivers above the dams, these mills effectively prevented reproduction.

Habitat degradation was another factor. Settlers required arable land for crops, so trees were cut down at a rapid rate. This caused several problems: erosion of stream banks and siltation of the gravel beds the fish used for spawning; loss of shade, which warmed the cold-water streams, making them inhospitable to young salmon; and reduction of the flow rate during summer months as water from spring thaw now rushed out to the lake rather than slowly percolating through the forest floor and into streams.

By the mid 1850s, the dwindling numbers of Atlantic salmon had become cause for alarm, and attention was turned to discovering the fish's spawning habits. Adult salmon were known to migrate upstream into the headwaters of tributaries and spawn over gravel. Typically this would occur in autumn. After spawning, the spent salmon, known as kelts, would rest in the stream briefly before returning to Lake Ontario. The salmon would repeat this spawning cycle once a year, two, three, or four more times before dying.

It had been known for centuries in Europe that Atlantic salmon eggs incubated during winter hatched sometime in April. It was discovered to be no different in Ontario. After hatching, the young salmon, known as parr, would

spend one or two years in the stream. They would then lose the dark markings down their sides, become silvery in colour, and make the trip downstream to Lake Ontario. These silvery smolts would spend another year or two in the lake before becoming adults.

So the life cycle of Lake Ontario's Atlantic salmon became known. But early naturalists did not know whether these fish were "landlocked" or went out to salt water as smolts—as do their counterparts in the rivers of eastern Canada. Scientists now know that many populations of Atlantic salmon in Canada and Europe do not go to sea. This was the case with the Lake Ontario salmon. They remained in Lake Ontario and its tributaries where there was always an abundance of food.

This plentiful source of energy allowed the lake's salmon to reach weights of 40 pounds (18 kg) and a maximum age of 13. Although the Atlantic salmon in Lake Ontario were rarely angled, in eastern Canada and Europe they are known for their legendary hard strike at bait, leaping propensity when hooked, and excellent-tasting flesh. This won them great respect in the sport-fishing and culinary worlds. But by just over a century ago, Atlantic salmon had been eradicated from Lake Ontario.

Since then, there have been several attempts to reintroduce the fish, with millions of fish and eggs transplanted into the lake at various times, from different Atlantic salmon populations throughout eastern North America. Different stocks have been tried, including ocean-going and "landlocked" populations. In each case, re-establishing a self-sustaining salmon population has been unsuccessful.

Various reasons have been put forward to explain the failure. Some environmentalists suggest that despite extensive restoration efforts, Lake Ontario has been so irreversibly altered by humans that it can no longer support a population of Atlantic salmon. Others argue that stocking efforts have not been extensive enough to reach the critical number of breeding fish to re-

Indulge Your Appetite.



Open Wednesday to Sunday,
11:30 am - 3:30 pm.
Open Friday, 11:30 am - 8:30 pm.
Fully licensed.
For reservations, please call
416 586.5622.





ABERNETHY & SON

HOROLOGISTS

Craft members of the British Horological Institute



*Specializing in the sympathetic restoration and maintenance of
better Clocks, Watches, Barometers, Music Boxes and Automata.*

3235 Yonge St., Toronto, Ontario, Canada

Head Office (416) 489-5643 / Shop (905) 887-5327 / Email david@abernethys.com

Visit us at www.abernethys.com



A world of discovery for future generations

Include the Museum in your will. Ask us how.



Royal Ontario
Museum Governors

Contact:

Michelle Osborne
mosborne@rom.on.ca
416.586.8012

THE ROM

PATRONS

The Right Honourable Mich  lle Jean,
C.C. C.M.M. C.D.
Governor General of Canada
The Hon. James K. Bartleman, OOnt
Lieutenant Governor of Ontario

BOARD OF TRUSTEES

Salvatore Badali, *Chair*
Ann Dumyn, *Vice-Chair*
Jack Cockwell, *Past Chair*

Elyse Allan, Martin Brodigan,
Susan E. Crocker, Andrew Faas,
Lloyd S. D. Fogler, Hamlin Grange,
Paul Haggis, Martha Hogarth, Christine Karzca,
Sandra Lawrence, David Mirvish,
Hari Panday, Marilyn Pilkington,
Barbara Stymiest, Judith Wolfson

Ex-officio

David Naylor, Rose Patten, William Thorsell

ROM BOARD OF GOVERNORS

James Temerty, *Chairman*
John F. Driscoll, *Vice-Chair*
Linda Hasenfratz, *Vice-Chair*

Governors

Shreyas Ajmera, Rudy Bratty, G. Raymond
Chang, Jack Cockwell, Michael Detlefsen,
Nicole Eaton, Robert Farquharson,
Gwen Harvey, Jennifer Ivey Bannock,
Michael Lee-Chin, Rebecca MacDonald,
Hon. Roy MacLaren, James W. McCutcheon,
Jack Mintz, Peter Oliver, David Palmer,
Robert E. Pierce, Elizabeth Samuel,
Joey Tanenbaum, Rita Tsang, Harriet Walker,
V. Prem Watsa, Richard Wernham

Ex-officio

Joan Randall, M. Joan Thompson,
William Thorsell, Salvatore Badali

HERITAGE GOVERNORS

Joan Randall, *Co-chair*
M. Joan Thompson, *Co-chair*

Bluma Appel, Robert D. Brown,
Joan Fitzpatrick, Robert Gillespie,
Ned Goodman, Kenneth W. Harrigan,
William B. Harris, Hon. Hal Jackman,
Thomas Kierans, Elsie Lo, Susanne Loewen,
Stephens B. Lowden, Brenda McCutcheon,
Jack McQuat, Frank Milligan,
Dixie Anne Montgomery, Frank Potter,
Wendy Rebanks, John A. Rhind,
William Sanderson, Thomas Savage,
Lynton R. Wilson

SENIOR STAFF

William Thorsell
Director and Chief Executive Officer
Margaret L. Beckel
Chief Operating Officer
and Secretary to the Board of Trustees
Mark Engstrom
Vice-president, Collections and Research
David Palmer
President and Executive Director,
Office of the ROM Governors

THE ROM'S MISSION
IS TO INSPIRE WONDER
AND BUILD UNDERSTANDING
OF HUMAN CULTURES
AND THE NATURAL WORLD.

build a population. Another factor is that the fish must now compete with non-native Pacific salmon and rainbow trout. Finally, it has also been suggested that the salmon species used for restocking may not be well enough adapted to survive in freshwater.

Clearly, the salmon best suited to survive in the lake would be the kind that originally lived there. After all, they thrived in the lake for millennia, and in the process they likely became specially adapted to its environment. We know that none of the original Atlantic salmon are left in Lake Ontario, but there is a chance that descendants or close relatives may still survive elsewhere. Historical reports indicate that before the Atlantic salmon disappeared from Lake Ontario, eggs from these fish were being introduced into rivers and lakes around eastern North America and possibly Argentina.

To determine whether any descendants or close relatives to the Lake Ontario fish still exist, we needed to examine their DNA. We turned to the ROM's ichthyology collections, which house six mounted fish from the original Lake Ontario Atlantic salmon population—the only ones known to exist. The chances of recovering DNA were thought to be slim; another research group had tried—without success—to recover DNA from the mounts using scale and skin samples.

We thought it possible that the approach had failed to yield DNA because the mounts have been chemically treated and painted. For our study, we chose bone for sampling, thinking it would be less vulnerable to the treatments on the mounted fish. Our theory seemed to be correct. We took a single bone, smaller than a toothpick, from the fin ray of each fish and successfully recovered DNA from three of the six mounts. Though highly degraded, the recovered DNA was usable for comparing these fish to other salmon populations. Already, we have discovered that the Atlantic salmon in Argentina did not come from eggs originating in Lake Ontario, as some scientists had suggested.

The work is still incomplete, though, and we are collecting more DNA. Since all six of the ROM's fish mounts came from the same place—Wilmot Creek—salmon bones from other sites have been added to our study. These bones, dated from the 14th century, were donated by Stephen Cox Thomas of Bioarchaeological Research. They come from excavations of Native North American villages in Ontario carried out by Archaeological Services Inc. Inclusion of these bones ensures that our study will better represent the genetic diversity that would have been present in this fish population.

When the lab work is complete, it will be possible to compare the DNA from Ontario's Atlantic salmon to that of salmon populations throughout North America. If we find any living descendants or close relatives of Lake Ontario Atlantic salmon, they can be used to enhance our chances of successfully restocking the lake.

The ROM's research on the Atlantic salmon was funded by the Canada-Ontario Agreement. Over the next five years, \$1.5 million will be spent restoring self-sustaining populations of Atlantic salmon to Lake Ontario and rehabilitating its cold-water streams. Restoring the Atlantic salmon to its rightful place as top predator in the Lake Ontario ecosystem will be an incredible feat of science and conservation, as well as the return of a remarkable component of our natural heritage.

This project is generously funded by Banrock Station Wines and the LCBO, with in-kind support from many organizations, including the Ontario Ministry of Natural Resources, Ontario Federation of Anglers and Hunters, Canadian Sportfishing Industry, Trees Ontario Foundation, Sir Sandford Fleming College, and Trout Unlimited.

Mary Burridge is an assistant curator in the Ichthyology Section, and Oliver Had-drath is a technician in the Ornithology Section, both of the ROM's Department of Natural History.

Shop Italian!



ROM MuseumStore

Featuring Italian-inspired merchandise until January 7, 2007.


Open Daily: 10:00 am - 6:00 pm.
Friday: 10:00 am - 9:30 pm.



Carlo Bugatti and the

Balancing traditional artistry with the experimentalism of modernity, artist-craftsman Carlo Bugatti's work provided a generative spring of Italian design throughout the 20th century.

By Michelangelo Sabatino



FOR CENTURIES, Italy has been world-renowned for its marvellous craftsmanship—in its architecture, art, decorative arts, painting, and sculpture. Aesthetics and ingenuity have always gone hand in hand for the people who inhabit this small area of land rich in natural and man-made beauty.

With the rise of industrialization during the 20th century, Italian arts started to reflect tension between two apparently contradictory impulses: the desire to continue with the legacy of elite artistic craftsmanship—in which the artist-artisan's workshop was key—and the need to fulfill the new demands of a modern society for which mass-production was seen as key to giving broad public access to merchandise.

Resisting the machine-age aesthetic that rejected national and regional values, several generations of Italian artists and architects of various political persuasions strove to achieve their own form of modernity by way of a creative dialogue with the past. The celebrated furnishings of artist-craftsman Carlo Bugatti (1856–1940) exemplify this multifaceted approach.

Most overviews of 20th-century Italian arts depict Bugatti as an eclectic idiosyncratic figure,

whose work falls somewhere between 19th-century historicism (which is based on the revival of various styles such as Gothic, Moorish, and Renaissance) and *Stile Liberty* (the Italian version of *Art Nouveau*). In the eyes of militant critics in Italy and abroad who based their modernity on abstraction and new technologies for building and manufacturing, Bugatti's dialogue with traditional modes of craftsmanship and materials, as well as his rejection of the "rationalism" of mass production, alienated him from the more radical proponents of modernity that surfaced after World War I.

Significant pieces by Bugatti from the ROM's collection—donated in the year 2000 by Joey and Toby Tanenbaum—suggest that he was indeed a modernist, though an unconventional one. Although he used traditional materials, his unique re-interpretation of the past allowed him to create quirky off-the-wall conversation pieces that shared little with 19th-century academic approaches to furniture design. The works trace his substantial contribution to Italian design by demonstrating how modernity can be achieved without breaking altogether with the forms and materials of the past. This creative dialogue was the generative



Art of Craftsmanship



© ESTATE OF CARLO BUGATTI / SODRAC (2006) PHOTO BRIAN BOYLE ROM / GIFT OF JOEY AND TOBY TANENBAUM / 2000 101 3

Atelier Carlo Bugatti, corner chair, Milan, Italy (c. 1895–1902), made of parchment, silk, and cotton.



spring of Italian design throughout the 20th century. Even today, especially in the realm of fashion, designers such as Giorgio Armani, Dolce & Gabbana, and Prada have marketed their products somewhere between the allure of traditional tailoring and the edginess of urban chic design.

Born in Milan in 1856, Bugatti entered the Brera Academy in that city to study art. His training as a "pure" artist played an important role in his transition to artist-artisan capable of producing objects that were both artistic and useful. After apprenticing for the furniture maker Mentasti in the late 1870s and completing his education at the École des Beaux-Arts in Paris, he set up his first workshop in Milan. He worked there for several years, establishing a reputation as his furniture started to be shown at exhibitions during the 1880s in Italy and abroad—at the Italian Exhibition at London's Earl's Court and subsequently in Antwerp, Amsterdam, Paris, and Turin. He moved to Paris in 1904, where he worked until World War I and advancing age prompted him to retire. After his wife died in 1935 he moved from Paris to Molsheim in Alsace to live with his son Ettore.

Since the 1950s, Italian designers and architects have looked to the past for guidance in bridging the divide between an aesthetic impetus to embody identity and the utilitarian impulse to "apply" arts in a consumer society. Because of the rich traditions from which Italian designers and manufacturers could draw, the country has been able to distinguish itself from others. After all, "high" and "low," "pure" and "utilitarian," arts have been created in the Italian peninsula throughout its history—from the pre-industrial city-states of the 15th century to the modern Italian nation of today. The cultural artifacts are diverse, ranging from Renaissance sculptor Lorenzo Ghiberti's gilded-bronze panelled doors for the Florence baptistery (1425) to architect and designer Ettore Sottsass's hugely popular Valentine typewriter produced by Olivetti (1969).

Carlo Bugatti's contribution to 20th-cen-

tury design is largely rooted in his commitment to craftsmanship in the wake of Italy's long-standing reliance on agrarian values and late embrace of industrialization. He established his reputation with furniture design that defied hard-line industrialization, insisting on the use of traditional organic materials such as wood, vellum, brass, and pewter in place of "new" materials such as steel. Compare Bugatti's handcrafted chairs, such as his corner chair of 1895-1902 to the iconic and "chilly" stainless steel Barcelona chair by Mies van der Rohe (1929).

With its sustained commitment to the ideal of craftsmanship in the 20th century, Italian design tended toward small-scale production of one-of-a-kind art objects rather than quantities of mass-produced serial objects. Consequently, for both period pieces and contemporary products, Italian design is still among the world's most expensive, especially compared to, for example, the affordable design and lifestyle concepts of the Scandinavian firm IKEA. Italian artist-craftsmen of the inter-war period (craftswomen were rare at the time, generally employed only in weaving and lace-making) and the wave of architects-turned-designers after World War II opted to preserve the luxury of time to conceive and execute their objects rather than to adapt to the speed of mass-produced modernity. Even today, the overwhelming proportion of Italian small- and medium-scale industries (for example, the firm Alessi, one of Italy's most internationally recognized housewares producers) attests to a continuing preference for quality control facilitated by a limited output for which the machine and the hand work side by side. After all, one of the root words of the verb manufacture, *manus*—Latin for hand—aptly describes handcraftsmanship rather than industrial processes.

Despite the popularity of its products, the Atelier Carlo Bugatti certainly followed the path of limited production. Bugatti created refined and costly handmade furnishings that graced the homes of the Italian and other European aristocracy and bourgeoisie. The handcrafted

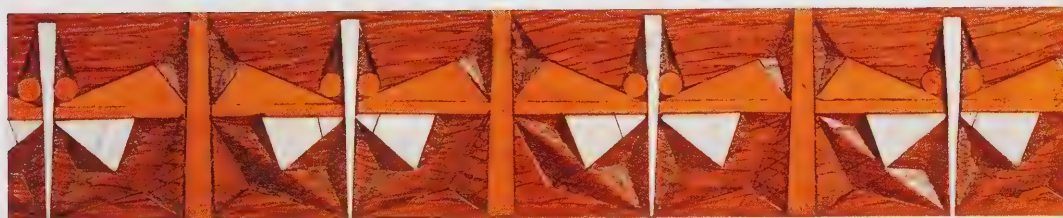




© ESTATE OF CARLO BUGATTI / SODRAC (2006). PHOTO: BRIAN BOYLE, ROM / GIFT OF JOEY AND TOBY TANENBAUM / 2000.101.2



© ESTATE OF CARLO BUGATTI / SODRAC (2006). PHOTO: BRIAN BOYLE, ROM / GIFT OF JOEY AND TOBY TANENBAUM / 2000.101.184 (TOP TO BOTTOM)



BRIAN BOYLE, ROM

Clockwise from top left: Atelier Carlo Bugatti, corner cabinet, Milan, Italy, c. 1895–1902, made of wood: applied brass has copper and pewter inlay. Atelier Carlo Bugatti, chest of drawers, France, c. 1904, made of oak, brass, and glass with pewter and bone inlay. Atelier Carlo Bugatti, dressing table, France, c. 1904, made of oak, pewter inlay, and glass. Detail from the dressing table.

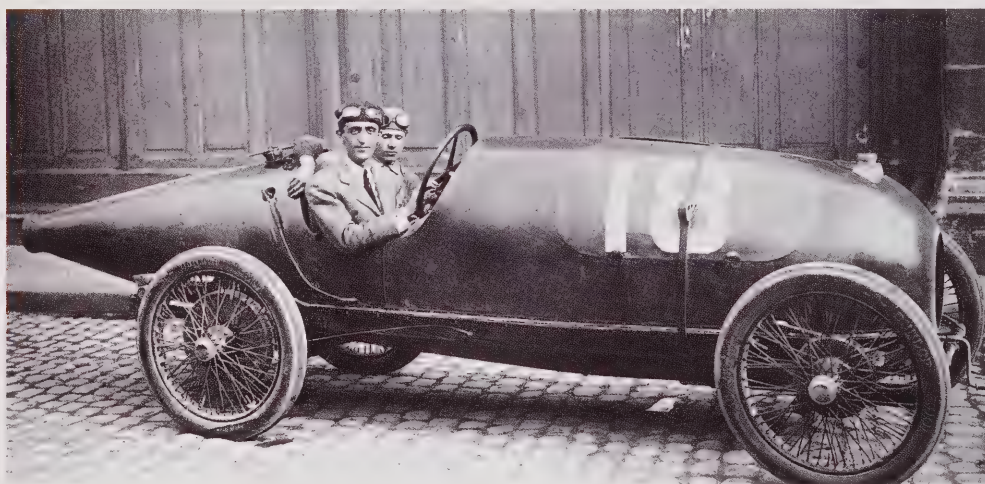


Father and Son: Ettore Bugatti...

Carlo Bugatti's son Ettore (1881–1939) possessed an equally keen sense of craftsmanship as his father, but he applied it to the design and execution of extraordinary automobiles, which quickly became icons of an age enamoured of the speed and adventure promised by motorcars, trains, and ocean liners. Using metal instead of wood, and replacing stasis with movement, Ettore transformed the know-how of the artisans in the Atelier Carlo Bugatti into a unique brand of high-tech craftsmanship.

Intriguingly, a chest of drawers Carlo produced for his own use and a dressing table made about the same time (c. 1904) show an affinity with the elliptic zoomorphic shapes and forms that were to characterize the radiator grills and sensual curves of Ettore's automobiles, for instance, the Type 30 (1922–1926). It is interesting to view these similarities not merely as formal echoes, or as the sentimental nod of son to father, but as a demonstration of how the Bugattis applied similar techniques of craftsmanship within different man-

THE BUGATTI TRUST



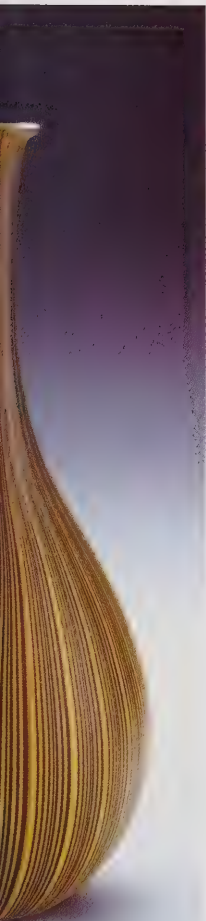
Left to right: Ettore Bugatti, automobile Type 30, 1922–1926. "Tessuto" glass vase by Carlo Scarpa for Venini, 1939. "Superleggera" chair by Gio Ponti, 1955, ash, cellophane, cane. "Valentine" typewriter by Ettore Sottsass and Perry Alan King for Olivetti, 1969, ABS and metal.

and highly ornate work was anachronistic when we consider that during the years in which his fame reached its peak—thanks to an exhibition in 1902 in Turin—the American industrialist Henry Ford was beginning to adapt the streamlining efficiency-based prin-

ciples of Frederic Taylor's "scientific management" to his Model-T assembly plants. Or when one considers that the Thonet Brothers in Europe were employing novel manufacturing techniques to bend wood to produce affordable yet beautiful lightweight chairs, in-



... and the Legacy of Carlo's Craftsmanship



LILIANE AND DAVID M. STEWART COLLECTION / PHOTO: CHRISTINE GUEST / THE MONTREAL MUSEUM OF FINE ART

ufacturing scenarios. While the Bugattis were particularly successful in combining modern methods with historical craftsmanship, they were not alone in the endeavour. The Venini "Tessuto" vase (1939), for example, designed by Venetian architect Carlo Scarpa, used a traditional glass-blowing technique to create a timeless object that evokes both the history of Venetian craftsmanship and the modern obsession with simplicity. Gio Ponti's reed-and-ash "Leggera" chair of 1948 is another example of Italian design that refined traditional



LILIANE AND DAVID M. STEWART COLLECTION / PHOTO: CHRISTINE GUEST / MMFA

vernacular precedents to meet the needs of a mass market in post-war Italy.

Adriano Olivetti—one of Italy's greatest entrepreneurs and design patrons, who specialized in typewriters as well as computers—also followed this pattern. His company's Italian designers, including Mario Bellini, Marcello Nizzoli, and Ettore Sottsass, combined their appreciation for an artistic craftsmanship that relied heavily—at least during the prototyping phase—on the tradition of handwork with a sensitivity to emergent forms of industrial production.



LILIANE AND DAVID M. STEWART COLLECTION / PHOTO: CHRISTINE GUEST / MMFA

cluding their famed bentwood rocker design.

Bugatti and his Atelier manufactured furnishings that were elitist in that only a small portion of society could afford them. Bugatti's "Italian" designs referenced Western as well as Middle Eastern and Asian man-made sources.

He also drew inspiration from anthropomorphic and zoomorphic models in the natural world. Even when Bugatti was looking to foreign sources for inspiration, his approach reflected Italian traditions of manufacture. But he also admired the craftsmanship of the Arts



and Crafts movement headed in England by socialist writer and designer William Morris. Whereas Morris preferred to look to the ordinary arts and crafts of the English rural peasantry for his models, Bugatti's rebellion against the dominance of academic classicism in Italy led him to the exoticism and curvilinear forms of plant and animal life and non-Western sources.

Reconciling artistic freedom with the functionalism of applied arts was not Bugatti's challenge alone. From a less elitist point of view, the militantly socialist Italian artist-artisan Duilio Cambellotti attempted to reinvent the arts and crafts of the peasantry of the Roman countryside. Rather than looking to exotic sources for inspiration as did Bugatti, Cambellotti's focus was much closer to home. He did much to elevate the status of the peasantry by incorporating agrarian symbols with which they were identified (grain sheaves, for example) in his paintings; he also produced pottery that employed techniques typically used by the peasantry. But ultimately, like Bugatti, he produced furnishing designs that were almost always out of reach for the average consumer. Despite their idealism, Cambellotti and the other followers of Morris in Italy did not achieve the much sought after reform of domesticity in their lifetimes.

Arts and Crafts adherents fervently wanted to avoid the alienation caused by the division of labour that accompanied industrial production, but they did not reach a broad audience with their handcrafted products in the way Morris had hoped. Early on, the German émigré critic and historian Nikolaus Pevsner condemned the contradictory and fundamentally elitist qualities of the Arts and Crafts movement. In his *Pioneers of the Modern Movement: From William Morris to Walter Gropius* (London: Faber & Faber, 1936), Pevsner argued that Morris's nostalgic anti-industrial vision was unable to fulfill the needs of a new mass society, unlike Walter Gropius's promotion of the marriage of art and industry, exemplified by his pedagogical program and his design for the Bauhaus in Dessau (1926).

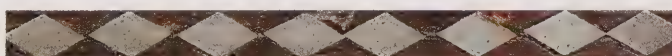
The rise of the bourgeoisie and the new working-class proletariat during the 19th and 20th centuries contributed significantly to the increased importance of domesticity. Urban homes in cities functioned as status symbols for the upper-middle class. With the rise of leisure travel and increased disposable wealth during the 19th century, the home and its furnishings served as a repository of memory—a makeshift personal museum. A Bugatti corner cabinet and corner chair (both c. 1895–1902) speak to the desire to create ornate, customized, and eccentric objects that were more *objets d'art* than utilitarian furnishings.

Perhaps it was the subversive quality of Carlo Bugatti's designs that attracted the admiration of 1920s Futurist artists such as Giacomo Balla, Fortunato Depero, and Filippo Tommaso Marinetti. One can discern this tension between a desire for the novelty of the unknown (Futurism) and the comfort of the familiar (tradition) in Balla's "primitive" furniture of the 1920s and in the cubo-futurist interpretation of the Trentino landscape in Depero's tapestry *Feste della sedia* (1927).

Rather than reject craftsmanship in favour of industrial processes, even the Futurists sought to combine traditional techniques with innovative modes of seeing the world. This way of being modern and traditional at the same time was the profound challenge that Italian modernism posed to those nihilists who were all too anxious to embrace "progress" at the expense of history. Carlo Bugatti's pioneering work helped shape this alternative and deserves to be remembered at a time when globalization threatens to divert artist-designers once again from a meaningful dialogue with tradition. ■

THIS ARTICLE IS DEDICATED TO SERGE AMBROSE.

The ROM exhibition *Italian Arts & Design: The 20th Century* runs from Saturday, October 28, 2006, to Sunday, January 7, 2007. Readers can learn to identify an Italian approach to design through close examination of the objects on view.





© ESTATE OF FORTUNATO DEPERO / SODRAC (2006) MARTI MUSEO D'ARTE MODERNA E CONTEMPORANEO DI TRENTO E ROVERETO



© ESTATE OF GIACOMO BALLA / SODRAC (2006). PRIVATE COLLECTION



Top and bottom left: Fortunato Depero, wall hanging, "Feste della sedia," 1927, wool cloth on cotton canvas, and detail of the hanging. **Right:** Giacomo Balla, painted wood chair, 1920s.





© ROM, IMAGE: B. CARON

On the Trail of a Phantom Fossil

By Jean-Bernard Caron and Dave Rudkin

The identity of a mystery fossil—discovered almost a century ago in Canada's



IT IS THE SUMMER OF 1998—the beginning of the end of a journey of discovery that began with a mystery find on a rocky ledge around 1910 and concluded almost a century later, on July 13, 2006, in the pages of the international scientific journal *Nature*. At the foot of a mountain in southeastern British Columbia, a ROM team packs equipment for a two-month-long expedition. Crew members, fitted with new heavy-duty hiking boots, fill stout canvas bags with crowbars, heavy hammers, and safety goggles.

The clattering arrival of a helicopter adds a martial twist to the scene. Quickly, bags are loaded into a large net slung beneath the aircraft and team members scramble aboard. The cabin is cramped and noisy, but the views en route are splendid. We are headed to the 505 million-year-old Burgess Shale in Yoho National Park, B.C., nestled in the Rocky Mountains. Designated a UNESCO World Heritage site in 1981, the Burgess Shale contains some of the best preserved fossils of early animal life on Earth. As soon as the chopper touches down, team members frenetically recover bags and equipment under the menacing spin of the rotor blades. Moments later, the aircraft departs in a plume of swirling dust.

The air at this elevation—about 2500 metres above sea level—feels pure and brisk. Even in the early days of July this part of the Canadian Rocky Mountains is often still covered in snow. Adapting to the morning chill will soon become part of the daily rou-

Excavating in Walcott Quarry, the Burgess Shale (1999). Burgess Pass and Mount Burgess can be seen in the background.

single perplexing specimen discovered
famed Burgess Shale—is finally revealed.

tine for crew members. But most are already keenly primed for the coming days.

This could be the scene of any "extreme alpine experience," with city-dwellers escaping into the deep Canadian wilderness (admittedly sans crow bars!), hauled by helicopter to the top of a mountain and then left to make their adventurous way down—on skis, on foot, or by mountain bike. But the urbanites in our story do not seek those kinds of thrills. Mostly, they are undergraduate students in geology or biology, and their passion is paleontology—the study of ancient life. They come from around the world and have planned for months for this chance to work at the half-billion-year-old Burgess Shale, one of the most famous fossil deposits on Earth.

Fossils are the remains of long-vanished organisms (animals, plants, microbes) or traces of animal activity (footprints, coprolites). Typically, they are entombed in sedimentary rock, and represent tangible evidence not only that evolution does indeed occur, but also that life originated long before dinosaurs and other animals, including human beings, roamed the earth. The vast majority of animal fossils consist only of the very toughest, most resilient parts of ancient creatures—shells, bones, and teeth, for instance—that were quickly buried, usually on the seabed. Biodegradable and easily consumable organic soft bits such as skin, muscle, and organs would have been scavenged and eaten, or would have decayed—and rapidly so in most cases. Nature is the consummate recycler, and the ultimate fate of most organisms is to be returned to simple molecular or elemental components.

Fossils from the Burgess Shale, by contrast, are extraordinarily well preserved. Body parts made of soft tissues, such as eyes, guts, and delicate limbs, are often present—sometimes in exquisite detail. Even entirely soft-bodied organisms are often preserved. Such extraordinary fossilization can happen only under very unusual conditions. Exactly what these conditions were in the Burgess Shale is still under investigation. Very rapid burial on the sea floor, lack of scavengers, variable oxygen levels in the sea water, and even the composition of the entombing mud—all have been cited as

probable key factors in the remarkable preservation of soft tissues.

Thanks to this exceptional preservation, the Burgess Shale provides an unrivalled window on early animal life, with more biological and ecological data than any other fossil groupings from the same time interval. The ROM is very fortunate to have the largest collection of Burgess Shale fossils in the world with an estimated 150,000 specimens held in trust for Parks Canada. They were collected by former curator-in-charge of the ROM's Invertebrate Paleontology section Dr. Desmond Collins during 20 field seasons.

It's hard to imagine just how old the Burgess Shale really is. But Toronto's CN Tower can be a useful reference point for illustrating "deep time." The height of the tower is 553.33 metres. If this dimension were scaled to the last 553.33 million years of Earth's history, then each metre of height would be the equivalent of one million years. The very bottom of the tower—ground level—represents the present day. The top of the tower marks the approximate age of the oldest known animal fossils. The Burgess Shale would plot just about 505 metres above ground. Dinosaurs, the most familiar icons of the fossil record, disappear 65 metres above ground. The oldest fossil hominids, the group we belong to, would appear just 5 metres from the bottom of the tower. Tutankhamun lived 3000 years ago, at a mere third of a centimetre from the bottom of the tower. When we begin to grasp their unfathomable age, it is no wonder that fossils hold so much fascination for humans.

**[Jean-Bernard Caron,
the ROM's new Burgess Shale
expert, gives his perspective]**

MY FIRST TRIP to the Burgess Shale, during the summer of 1998, was also the first time I set foot on Canadian soil. Desmond Collins had invited me to join his collecting crew at the original discovery site—hence the most famous of Burgess Shale localities—the Walcott Quarry. The site was named after eminent American paleontologist Charles Doolittle Walcott, then secretary of the Smithsonian Institution in Washington, D.C.,



© J.-B. CARON



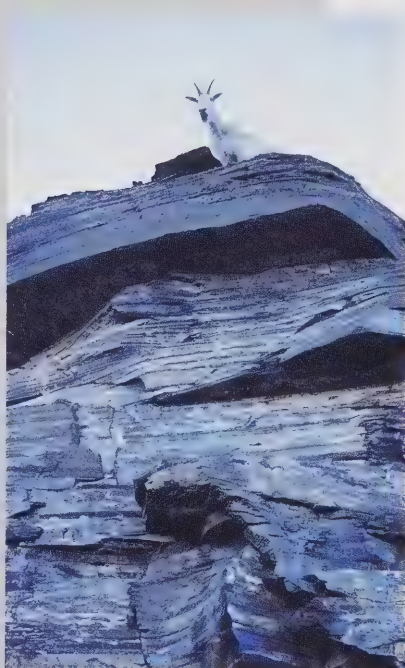
© ROM, PHOTO: D. RUDKIN



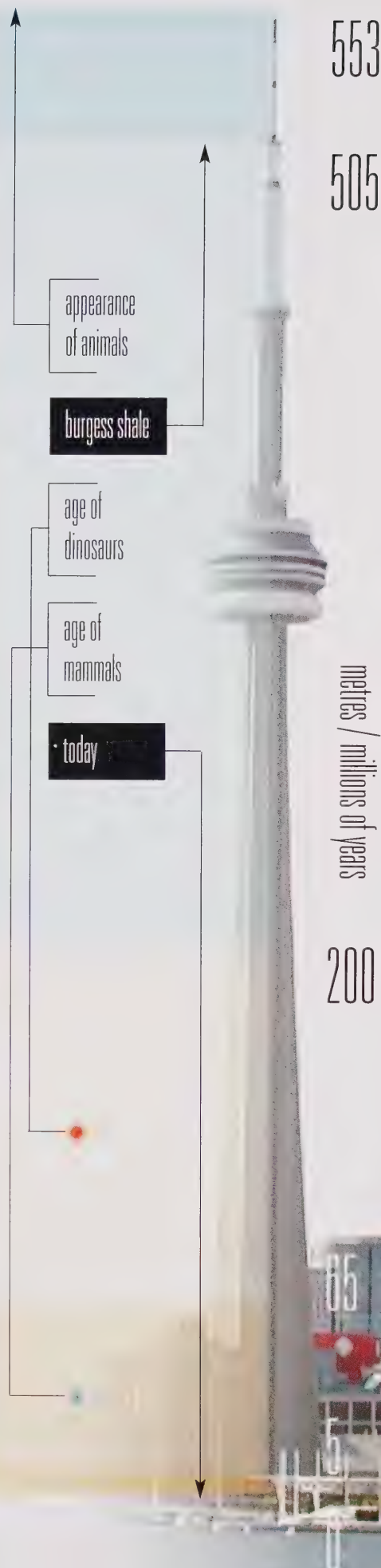
© ROM, PHOTO: J.-B. CARON



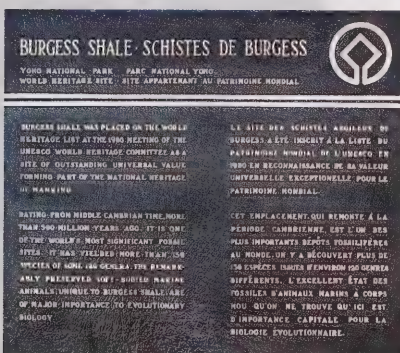
© ROM, PHOTO D. RUDKIN



© J.-B. CARON



Clockwise from top left:
The 1998 ROM field crew; a helicopter sling-lifts equipment during the first ROM Burgess Shale expedition in 1975; a mountain goat watches the crew; dedication plaque for the Burgess Shale, a UNESCO World Heritage Site; the first ROM field camp below Fossil Ridge (1975); ROM field crew members at work in the Walcott Quarry (1998); loading supplies from Field, BC (1975).



© ROM, PHOTO: D. COLLINS



© ROM, PHOTO: D. RUDKIN

who found the first Burgess Shale fossils below the quarry area in August 1909.

From the site, the view is enchanting—pristine snow blankets the mountain peaks, contrasting with the deep green conifers on the lower slopes and the jewel-like turquoise lakes. In this splendid setting, the quarry appears as just a tiny scar on the narrow arête, auspiciously named Fossil Ridge, joining Wapta Mountain and Mount Field in Yoho National Park. The quarry is above the treeline, where, amid razor-edged rock slabs, only stunted bushes and hardy alpine flowers can survive the rigours of altitude and exposure.

On the slope below the quarry the crew found many fossils in slabs discarded by earlier generations of workers from various institutions—the Smithsonian Institution, Harvard University, and the Geological Survey of Canada. But fossils collected by recent ROM expeditions come mostly from the quarry itself, collected *in situ* using simple mining techniques. Crew members drilled vertical holes at regular intervals and inserted wedges to allow large blocks of rock to be extracted by hand sledging. The blocks were then split into thin layers to reveal the fossils. Explosives were prohibited to avoid disturbing local wildlife, including chipmunks, ground squirrels, and the occasional golden eagle. Herds of mountain goats also wandered around the quarry, often quietly observing us, seemingly intrigued by the banging of our hammers on chisels and rocks.

Little did we know that many of the fossils of the animal *Odontogriphus* that went on to star in the 2006 *Nature* article would be discovered during that trip, a few weeks before the end of the field season, in late August 1998. They were found at a level called “-235,” a negative number representing a level about 235 cm below the original floor of the Walcott Quarry. The discovery of fossils in these negative layers, which Walcott thought barren of fossils 80 years earlier, was a significant ROM achievement. Collecting fossils in stratigraphical order without mixing specimens from different levels was a particularly important goal for ROM team members. This kind of systematic collecting had not been attempted in such detail by other institutions and would later prove to be of partic-

ular scientific value. During my PhD studies, completed in 2005, I examined 36 of these levels and about 70,000 specimens. Each level represents a page of history of the community preserved at the bottom of the sea. After reading successive “pages” of this lithified book using special statistical methods, I was able to reconstruct in exacting detail how the community changed through time.

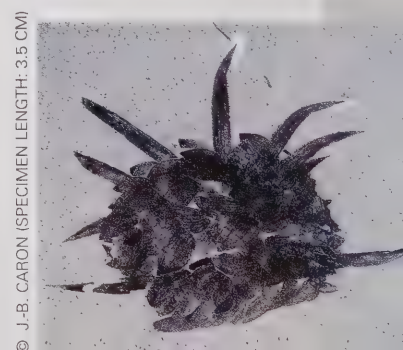
A few days before the end of our dig, the first mystery fossils showed up—as faint dark outlines with no obvious discerning features. This was rather surprising and highly unusual for the Burgess Shale, where most fossils have readily visible features, such as shells, spines, scales, eyes, body segments, limbs, or claws. Some crew members interpreted the odd forms as possible sponges or as parts of a larger animal. But none of these explanations was really convincing, because even a sponge from the Burgess Shale typically has a texture of overlapping needle-like elements that can easily be identified.

Almost all of our specimens appeared as black ovoid shapes, and virtually nothing else . . . just mysterious phantoms of their once-living selves. Whatever these fossils represented, they obviously belonged to a complex and diverse animal community living near or on the sea floor, judging by the numerous other animals preserved in the same levels. Fortunately, one particularly fine specimen revealed what seemed to be a mouth-like structure that immediately captured our attention.

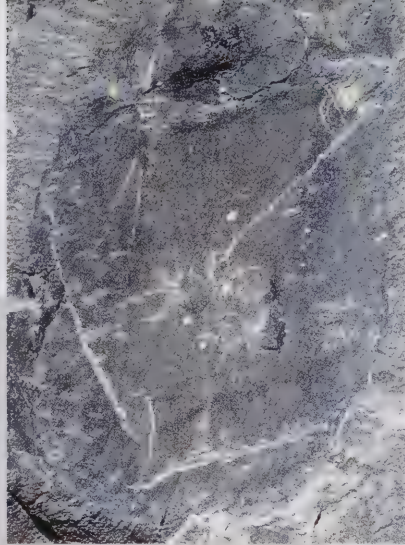
Because of the unusual shape of this mouth apparatus, it dawned on us that this animal was none other than the enigmatic *Odontogriphus omalus*. Known previously from only a single poorly preserved specimen collected in an excavation led by Walcott himself, *Odontogriphus* was one of the rarest of all Burgess Shale fossils. By the end of the 1998 season, we had acquired 16 additional individuals, a veritable feast. As it turned out, a few unrecognized specimens of *Odontogriphus* had actually been collected by ROM teams in prior seasons and identified simply as the “radula-animal,” so called because it possessed a tongue-like feature called a radula. The relationship between the new 1998 finds



© CARON ET AL., NATURE, 2006 (SPECIMEN LENGTH: 10.7 CM)



© J.-B. CARON (SPECIMEN LENGTH: 3.5 CM)



© ROM. PHOTO: D. COLLINS (SPECIMEN LENGTH: 4 CM)



© CARON ET AL., NATURE, 2006 (SPECIMEN LENGTH: 7 CM)

and these previous unrecognized ones became evident only later, after careful observation of the specimens in the Museum's collection vaults.

I returned to the Burgess Shale with ROM crews in 1999 and again in 2000, and during those two seasons we collected many more examples, particularly from level "-260"—the origin, ultimately, of most of our *Odontogriphus* specimens. Today the ROM possesses a unique and extraordinary collection of nearly 200 specimens, including individuals of such outstanding preservation that we can gain a far better understanding of the anatomy and relationships of this peculiar animal that lived more than half a billion years ago.

The Species in Question

So WHAT IS *Odontogriphus omalus*? To understand the whole story, we must flash briefly back in time to the early 20th century. Following his serendipitous discovery of the first Burgess Shale fossils in 1909, Charles Doolittle Walcott eagerly returned to Fossil Ridge for five seasons between 1910 and 1917, excavating and amassing an extensive collection of some 65,000 specimens, which he stored at the Smithsonian. Walcott rapidly produced a series of "preliminary" publications, describing, naming, and illustrating many of the extraordinary fossils. The Burgess Shale became an overnight paleontological sensation.

But despite his amazing energy (he was in his 60th year in 1910), Walcott was unable to complete descriptions of the multitude of new forms and, following his death in 1927, many of the rarest or most enigmatic specimens lay undisturbed in the Smithsonian's collection cabinets. Among those latent treasures were two small pieces of rock, part and counterpart of the same split slab, bearing the ghostly image of one very odd creature.

Fast forward to the early 1970s. After languishing for many years, the Burgess Shale and its wonderful fossils experience a sudden resurgence of interest, driven in part by the reopening and expansion of Walcott's Quarry by the Geological Survey of Canada (1966–1967). Under the astute paleontological leadership of Professor Harry Whittington of

Clockwise from top left: ROM specimen of *Odontogriphus omalus*; the original *Odontogriphus omalus* specimen, Smithsonian Institution; another ROM specimen of *Odontogriphus omalus*; the original reconstruction of *Odontogriphus* by S. Conway Morris; reconstruction of the 555-million-year-old *Kimberella quadrata*, a possible ancestor of *Odontogriphus* and *Wiwaxia*; *Wiwaxia corrugata*, a cousin of *Odontogriphus* with a similar radula.



© PALAEOLOGY, S. CONWAY MORRIS, 1976



© FEDONKIN & WAGGONER, NATURE, 1997

Cambridge University, excavators carefully applied new methods in an intensive study of both previously described forms and new "unknowns." As part of their doctoral studies, Whittington's small contingent of bright, eager graduate students tackled various components of the Burgess Shale biota.

One of these promising young paleontologists, Simon Conway Morris, was assigned the unenviable task of untangling all the so-called "worms"—a rather messy assemblage of largely unrelated animals that for the most part share only a vaguely elongate shape. In 1974, on a study visit to the Smithsonian's U.S. National Museum, Conway Morris located a small rock slab bearing the faint outline of a most unusual and puzzling fossil. Subsequently, he recognized its counterpart in a separate area of Walcott's collection and set the phantom aside for future contemplation.

**[Dave Rudkin, assistant curator
of paleontology at the ROM,
gives his perspective]**

IT IS JUNE 1975, a scene almost identical to the one described by Jean-Bernard Caron in the summer of 1998. I find myself standing on an open grassy area beside the Kicking Horse River in southern British Columbia, watching a Bell Jet Ranger labouring to hoist a heavy sling load of wooden crates over Burgess Pass. All around me, other crew members hurriedly ready the next net-full of supplies and equipment. The flight is relatively short—about 5 kilometres straight-line distance and a little less than 1000 metres in altitude.

When all the sling loads have been shifted, it is time for the remaining crew to strap into the cabin and take the last flight in. It seems like a lot of hard work, lugging and stacking cartons of canned food, crates of hammers and chisels, and piles of 10-foot (3-metre) long two-by-fours. But just 60 years before, in Charles Walcott's time, all the necessities of a working alpine field camp would have to have been hauled up a long mountain trail on the backs of men and packhorses.

Our goal in 1975 was to locate and collect Burgess Shale fossils for a new ROM

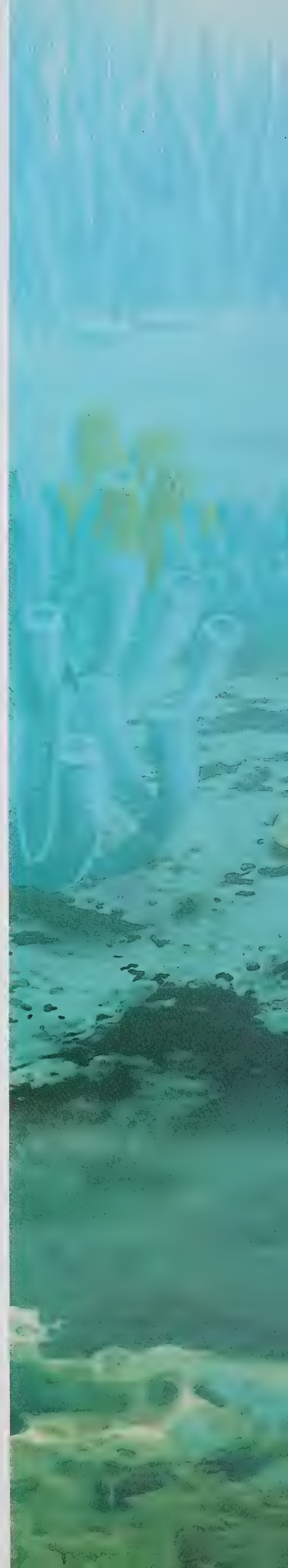
gallery, the first public display in Canada of these world-famous fossils. Our permit from Parks Canada did not allow us to remove rock from the original quarry sites, so we spent the next two months systematically scouring the talus slope below the earlier excavations, splitting loose slabs to find fossils that had eluded previous field parties. Not as glamorous and productive an operation, perhaps, as those of our illustrious predecessors, but for me, a paleontology undergraduate, it was still an awesome privilege to sit on a mountainside amid the most famous fossils in the world.

At the end of the 1975 field season, project director Desmond Collins asked me to stay on to tackle the task of unpacking, washing, sorting, and identifying the thousands of fossils we had collected. What an extraordinary opportunity—not only to continue to work with these amazing fossils, but to find myself in contact with the major players on the new Burgess Shale circuit.

Within a year, two of the rising Cambridge stars—Derek Briggs and Simon Conway Morris, the same Conway Morris who had discovered and set aside the mysterious fossil in the Smithsonian Walcott collections in 1974—had visited the new ROM collections. In May 1976, a scant month before his journey to Toronto and the ROM, Conway Morris's very first Burgess Shale paper appeared in the British journal *Palaeontology*. The subject was none other than that singular and mysterious Smithsonian phantom, now formally described and officially named *Odontogriphus omalus*.

The unique specimen was not particularly well preserved, and its few visible features were difficult to interpret. But Conway Morris's careful analysis yielded a convincing anatomical reconstruction. Somewhat less satisfying, at least for many paleontologists, was his idea about where it belonged in the biological family tree—a conclusion embedded in the title of his paper: "A new Cambrian lophophorate from the Burgess Shale of British Columbia."

The lophophorates include several diverse groups of unrelated invertebrate animals, mostly sea-dwellers. They differ greatly in overall appearance but share a rather similar feeding apparatus—a small,





McColline
© 2006

Reconstruction of Burgess Shale animals
that lived in the Walcott Quarry community.
A colony of *Odontograptus* are grazing
on bacterial mat-like surfaces.

tentacle-bearing loop of tissue, the lophophore. The single specimen of what he named *Odontogriphus* appeared to possess, so Conway Morris thought at the time, a lophophore-shaped structure in which soft, tentacle-like extensions were supported by tiny internal cones, or "teeth," of mineral matter. It was a bold proposal and raised the hackles of many at the time, but Conway Morris was never one to shy away from contentious statements. The Latin root of his chosen genus name, *Odontogriphus*, however, reveals some measure of caution—it means, literally, "toothed riddle."

When Conway Morris arrived at the ROM shortly after his *Odontogriphus* paper was published, one of his prime concerns was finding additional specimens in the Toronto collections that would either confirm or disprove his interpretation. Although the ROM material from 1975 held many wonderful surprises, the toothed riddle was not among them.

The Phantom Unmasked

When describing a new species, a paleontologist prefers to work with as many specimens as possible for one simple reason: to avoid interpreting features that are not genuine. Despite the generally superb quality of preservation of Burgess Shale fossils, many reveal evidence of decay and thus potential loss or distortion of some of the original soft tissue features.

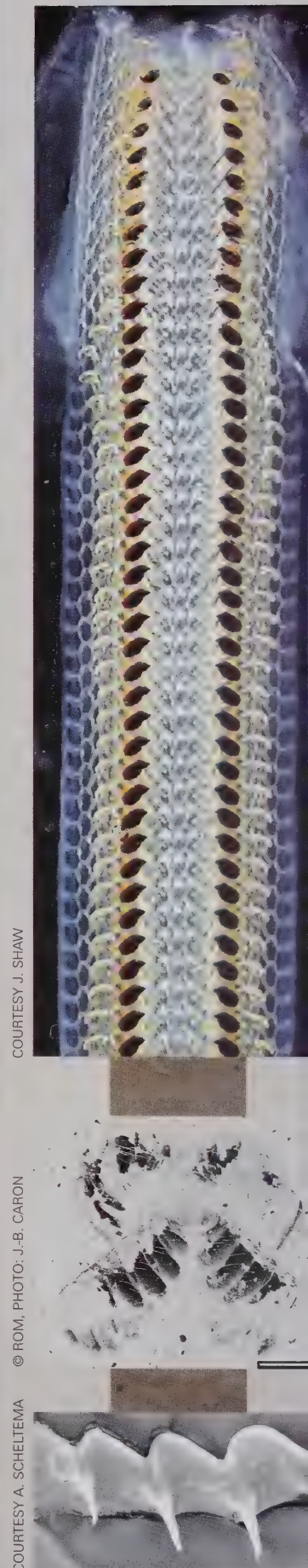
The Smithsonian *Odontogriphus* specimen studied by Conway Morris shows signs of such decay and is also missing the posterior-most part. But the ROM *Odontogriphus* specimens collected in the late 1990s provide a much more comprehensive and detailed picture of the animal than Conway Morris could possibly have developed based on that single original sample. Most of our specimens are complete and few show signs of decay. Retrospectively, however, Conway Morris had been able to "guess" remarkably well what the animal looked like in life. The species name—*omalus*—that he chose for *Odontogriphus*—means "dorso-ventrally compressed nature" in Latin. Detailed observations of our specimens verified that the animal was, indeed, flattened from top to

bottom when alive, confirming Conway Morris's talent in reconstructing animals in three-dimensions.

When Dave and I decided to re-examine this odd animal in September 2005, Amélie Scheltema of Woods Hole Oceanographic Institution in Massachusetts and Christoffer Schander from the University of Bergen in Norway joined us. Both Scheltema and Schander are biologists and work on modern molluscs. Dave and I are paleontologists. The marriage of competences was ideal. The new specimens, some as large as 12 cm long and 4 cm wide, show that the animal was roughly ovoid in outline. The striking feature that Simon had described as a "lophophore" turned out, in fact, to be a distinct mouth apparatus armed with a series of rows of "teeth," which seem to be positioned as on a conveyor belt. We interpreted this feature not as a lophophore, but as a radula, a kind of toothed tongue—a feature unique to molluscs (See "Radula: A Unique Mollusc Feature").

Since *Odontogriphus* clearly possessed a radula, we had one very important clue to its biological relationship with molluscs. We also knew, however, that a single character was not enough to prove its identity, especially since many animals from the Burgess Shale display unusual mixtures of characters quite unlike those that typify different groups of animals today. A ventral foot surrounded by a series of gills provided further strong evidence for a molluscan affinity. But unlike most modern molluscs, this animal had no shell: the ghost was a completely soft-bodied mollusc with no armour.

What makes this discovery so important is what it tells us about early animal evolution. It is widely thought that most modern animal groups appeared during what is called the "Cambrian explosion," which started about 540 million years ago. Prior to that, life was more rudimentary. Just a few kinds of relatively simple animals, such as sponges, were unequivocally present. By the time of the Burgess Shale, complex animals had already diversified into the major groups still known today. (The chordates, the group to which humans belong, for example, were represented by tiny, slender swim-



COURTESY J. SHAW

© ROM, PHOTO: J.-B. CARON

COURTESY A. SCHELTEMA

Radula: A Unique Mollusc Feature

Molluscs, including the familiar squids, snails, and clams, represent one of the most diverse groups of animals living today, with possibly more than 200,000 extant species. If you look at the ventral or underside of a modern snail through the side of an aquarium, you can often see the animal using its radula, a sort of toothed tongue, as a rasping tool to scrape and ingest accumulated algae and bacteria from the inner glass surface. The shape, size, and structure of the radula vary widely among different molluscs, but radulas are found only in this group. Most molluscs also possess a mineralized shell that is readily preserved after the animal's death, and these remains are found in fossil deposits worldwide. With our new interpretation, *Odontogriphus* becomes the first convincing entirely shell-less mollusc in the fossil record.

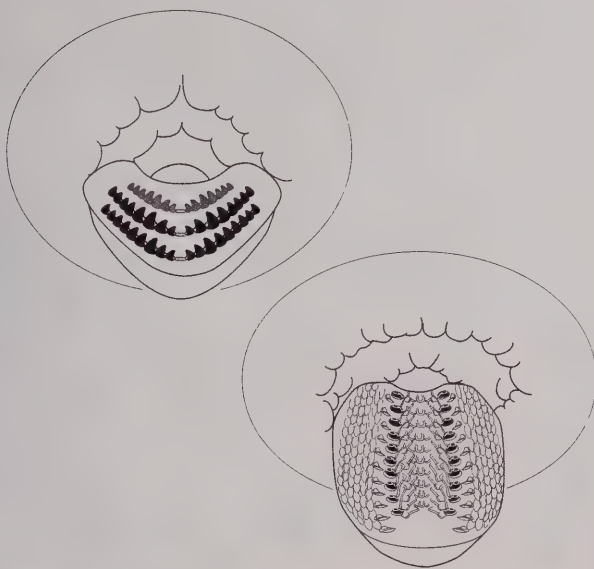


ILLUSTRATION BY MARIANNE COLLINS, 2006

Top left: Radula of the modern mollusc *Acanthopleura hirtosa*—numerous rows of teeth on a ribbon-like surface. The scale bar (bottom right corner) represents 1 mm. **Middle left:** Backscattered electron image of a radula of *Odontogriphus omaius*. The scale bar (bottom right corner) represents 400µm. **Bottom left:** Scanning electron micrograph of a partial radula tooth row of the modern mollusc *Helicoradomenia acredema*. **Above:** Radula reconstruction. **Top:** *Odontogriphus*. **Bottom:** Modern mollusc.

ming forms, such as *Pikaia*.) They quickly colonized many ecological niches within the seas. In this evolutionary scenario, the first molluscs were thought to be small and to have a single shell.

But *Odontogriphus* shows that early molluscs were actually large (up to 12 cm long) and unarmoured. It now seems probable that shells in molluscs evolved as secondary features. We also demonstrate that *Wiwaxia corrugata* (another enigmatic fossil from the Burgess Shale, most recently thought to represent a segmented bristle-worm) possesses a radula virtually identical to that of *Odontogriphus*. The best explanation for this striking similarity is that *Odontogriphus* and *Wiwaxia* were related and inherited the feature from an earlier common ancestor.

Such an ancestor might look something like *Kimberella*, a 555-million-year-old fossil known from Russia and Australia. *Kimberella*, a bizarre, superficially *Odontogriphus*-like form, had previously been interpreted by some paleontologists as an early shell-less mollusc. Our study certainly reinforces this supposition. Associated trace fossils further suggest that *Kimberella* had a radula and lived as a sea-floor grazer, consuming widespread bacterial growths. *Odontogriphus* and *Wiwaxia* can thus be interpreted as Cambrian representatives of an even older lineage, living as shell-less grazers on the sea floor.

Their demise (neither is known from deposits much younger than the Burgess Shale) and replacement by shell-bearing molluscs is most likely linked to the contemporaneous disappearance of their food source—extensive sea-floor growths of bacteria and algae—and to their lack of armour in an increasingly predatory world. Like the panda in the bamboo forests of China today, *Odontogriphus* and kin would have been unlucky witnesses and victims of their vanishing environment . . . future phantoms of the fossil record. ■

For details on the identifying of *Odontogriphus*, check out Jean-Bernard Caron and Dave Rudkin's article in the scientific journal *Nature*: "A soft-bodied mollusc with radula from the Middle Cambrian Burgess Shale. *Nature*, 442(7099):159–163.

the big smoke



THE SIGHT OF DIE-HARD SMOKERS milling around outside buildings in all kinds of weather during work hours has become a common one. These days, smokers are near outlaws, a new social standard that is well reflected in the 2005 movie *Thank you for Smoking*. In the film, a lobbyist for the declining tobacco industry tries to persuade Hollywood to revitalize the use of tobacco by having on-screen stars make smoking glamorous once again. The protagonist knows how it works: show us a Humphrey Bogart taking a long, long drag on a cigarette before delivering some memorable line and for all

It inspired a fatwa in the 1600s and, in more recent times, legions of moviegoers keen to emulate Hollywood glamour. Smoking can be traced back for centuries to far-flung lands.



By Ed Keall

time moviegoers will associate the image with smoking.

It was not so long ago that smoking was decidedly cool. Even a museum curator could take this position once upon a time. Writing in 1924 for the Chicago Field Museum, curator Berthold Laufer presented a number of overviews on the origins of smoking—in the Americas of course, as well as in Asia, Africa, and Europe. In the conclusion, Laufer wrote:

as tobacco, then it became an immediate concern for religious experts. Medical and legal authorities would be called to court to debate the effects of using the substance and to decide whether or not it was therefore legal.

Surprisingly, in spite of the early religious edicts against its use, tobacco smoking gained popularity very quickly in the Islamic world. Today the water pipe (often called a shishah) is



Ilames syriennes dans leur intérieur is a romantic, staged photograph of two Syrian girls smoking a shishah as posed by the family firm of Bonfils around 1860.

"Of all the gifts of nature, tobacco has been the most potent social factor, the most efficient peace-maker, and a great benefactor of mankind. It has made the whole world akin and united it in a common bond. Of all the luxuries, it is the most democratic and most universal; it has contributed a large share towards democratizing the world."

Contrast this with the year 1623 when Ottoman Sultan Murad IV issued a fatwa (religious edict) decreeing that the death penalty could be imposed on those violating the ban on tobacco smoking. In the Islamic world, from the very moment that tobacco was introduced around 1600, the issue of smoking was debated endlessly. According to principles spelled out in the Koran, anything that alters the mind artificially, such as alcohol, is forbidden (haram). If a substance was not known when the Koran was composed, such

synonymous with Middle Eastern material culture.

I first started to think about the precise moment when tobacco was introduced into the Middle East, and whether there could have been any substance smoked in the Old World before tobacco, during the 1990s, when I was directing expeditions of the ROM Archaeological Mission to Yemen in the city of Zabid.

The conundrum evolved as I tried to make sense of a group of artifacts excavated from the remains of a military fort in Zabid. Built in the 16th century, the fort was part of an Ottoman Turkish strategy to control Yemen and to help keep the Red Sea and the holy city of Mecca out of the hands of the Portuguese.

What is striking is that among the artifacts recovered from the Ottoman fort are assorted ceramic coffee cups and smokers' pipes made from a clay whose source ROM re-

search has determined to be local. The utensils are finely made, indicating that the garrison could indulge in their relaxations with items of elegance, in spite of what we may perceive to have been beleaguered conditions. The presence of the coffee cups is interesting, though not controversial (see "Getting to the Roots of Java," page 37). What is surprising, however, is that we find smokers' pipes in the same context.

for tobacco consumption there that is well known to historians is the written record of a Turk who was piloting an English ship into Istanbul in 1602. When he boarded the ship in the Dardanelles, he asked the captain for a smoke. Subsequently, the Middle East proved to have ideal soil and conditions for cultivating tobacco, and smoking became a universal pastime ever after.



ROM 965 X 276.1 / BRIAN BOYLE, ROM

Members of a typical Tehran harem smoking a shishah while a samovar heats tea. Qajar Persian painting, late 19th century.

To appreciate why this is significant, we must acknowledge that the Ottoman occupation of Yemen lasted at most just over a century. The first soldiers arrived in 1516; by 1635 they had all departed. Zabid was actually the last Ottoman stronghold in Yemen. Obviously we might excavate a pipe dropped accidentally in those last hurried hours. But the fort had been built decades before. Circumstantial evidence points to a date around 1568, when the Yemeni insurgency against the Ottomans began in earnest. There is evidence that houses on the east side of Zabid were demolished at that time, likely both to provide instant building materials for the fort, and to furnish the troops with a clear sight-line of any attackers. The smoking pipes, then, could date to anywhere between 1568 and 1635.

It has generally been held that the Ottomans acquired the habit of smoking tobacco from western Europeans around the end of the 16th century. The earliest evidence

Yet I suspect the pipes excavated in Zabid could be several decades older than that. Reinforcing this possibility is an obscure Yemeni Arabic text, dated to around 1580, which compares the pleasures of smoking a dry pipe to those of smoking a water pipe. This is unequivocal evidence that the habit of smoking was known in Yemen at least 20 years before 1602.

The text and its reference to dry pipes and water pipes is also highly significant in another way. In the New World, tobacco was universally smoked either in a dry-stem pipe or as a rolled leaf, like a cigar. Normally when we adopt a habit, we also adopt the paraphernalia that goes along with it. So the question arises: Who first thought of the idea of drawing tobacco smoke through water, to cool it, in a hubble-bubble? And how do we find out, if no text exists to give us a clue?

Our knowledge of the past tends to be built up largely from bits and pieces of written evidence that have survived

The Written Word: How Useful is It?

For archaeologists, written texts are both a blessing and a curse. Texts do give clues, but only to the topics that are preserved in those particular texts. What if the record of a particular behaviour has not been preserved? For the archaeologist of historical time periods, the broad brushstrokes of history are already laid out in written chronicles. Acts of kings are trumpeted in official inscriptions; documents record commercial transactions; and records of incantations and graffiti reflect the intimate details of the lives of ordinary people.

Archaeologists who investigate cultures that existed before the invention of writing face different challenges from those who work in historical time periods. Without the benefit of written documents, pre-historians must rely for their interpretation of a culture on painstaking analysis of artifacts and the contexts in which they are discovered. This method carries an inherent danger of misinterpreting their finds. The best example of this is how archaeologists once excavating a Neolithic site in Iraqi Kurdistan interpreted traces of pollen found around skeletons as evidence of a commemorative, seemingly tender, burial act in which flowers were placed in the grave of the deceased. Unfortunately, the workmen helping excavate the site were local farmers whose clothes may have carried traces of pollens from the plants they grew, which permeated the dirt from which the analytical samples were drawn.

On the other hand, we cannot extol unreservedly the superior value of written history as a guide for the archaeologist without acknowledging there is another inherent danger: That historians may place an inordinate amount of trust in what people have written in the past. Can we trust that statements written long ago are true? Of course, specific references to events and their participants give us irrefutable illuminations of pivotal moments in history. But what if this was propaganda in the same way that press releases today may reflect the spin of those issuing them? And what if chance has obliterated the record of an equally pivotal moment? How might our perspective on the record of history have changed if other documents had survived?

This kind of question always presents itself at excavations of historical sites, and sometimes archaeologists must come up with their own ideas. If they attempt to promote a new interpretation of history, they must be especially sure of their facts. They must also be cautious about assuming that their discoveries will make it quickly into the historical mainstream. It can take a generation or more for the new principle to become an accepted "fact."

through a variety of chances and selectivity (see "The Written Word: How Useful is It?" at left). But archaeologists who investigate cultures that existed before the invention of writing face different challenges: the pre-historian's interpretation of a culture must rely entirely upon careful analysis of artifacts and the contexts in which they are found.

There is an inherent danger that they may misinterpret by imposing their own value judgments on the past. On the other hand, if conventional history texts are used as an irrefutable guide, there is a danger that archaeologists may dis-

990.152.1, 282, 324, 328, 531, 550 / BRIAN BOYLE, ROM



982.184.106, 983.243.18, 990.152.286, 288, 322, 549



THAL PIPE: PRIVATE COLLECTION, E. KEAL

Top: Tobacco holders for diminutive water pipes excavated by the ROM expedition to Zabid, Yemen, 16th-18th centuries. Bottom: Dry stem tobacco pipes excavated by the ROM expedition to Zabid, Yemen, 16th-20th centuries. In lower right of the image is a Thal pipe, 10th century.

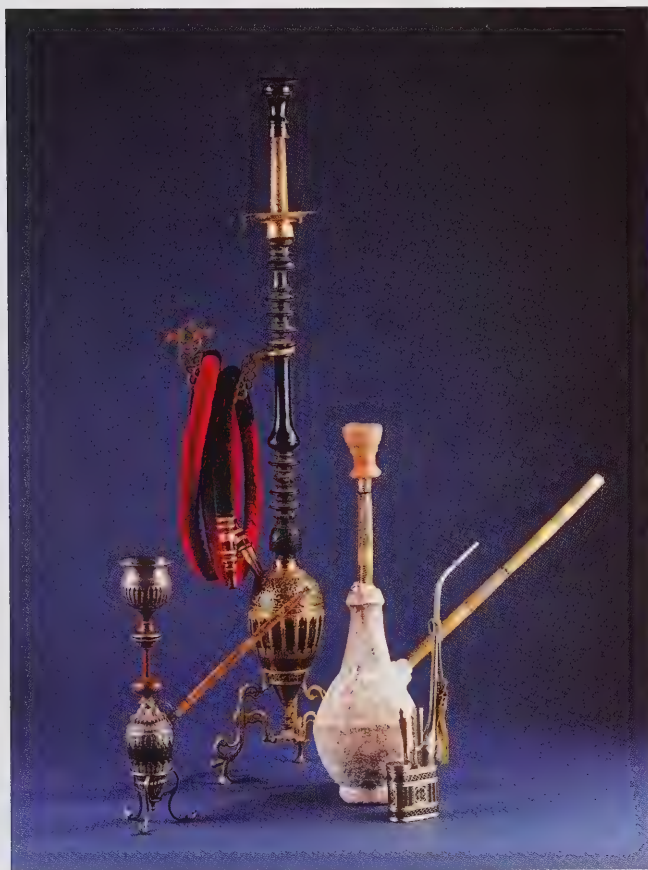
tort the archaeological finds to fit the traditional consensus. In the end, the mute stones can speak, and, the written record is sometimes false. So it is exciting to think that archaeologists have the skills and the opportunity to make some small change to our perception of the past, which I suspect will be the case with the question of smoking in the Old World.

If people were smoking water pipes before tobacco appeared in the region, we may legitimately ask what was being smoked. What evidence is there that people inhaled substances in the ancient world before tobacco? Apart from

the obvious assumption that surely someone in ancient times must have smelled something burning and tried to replicate the pleasure, there is unequivocal evidence that substances were smoked centuries before tobacco: evidence such as three small smokers' pipes on display in the Archaeological Museum in Cordova, Spain. The label reads simply "pipes, 10th century." Similar ones have been found elsewhere in southern Spain, at Badajoz and Granada. This evidence appears to corroborate that these pipes were used for smoking a substance before the arrival of tobacco.

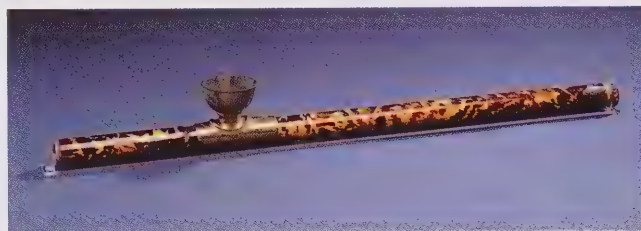
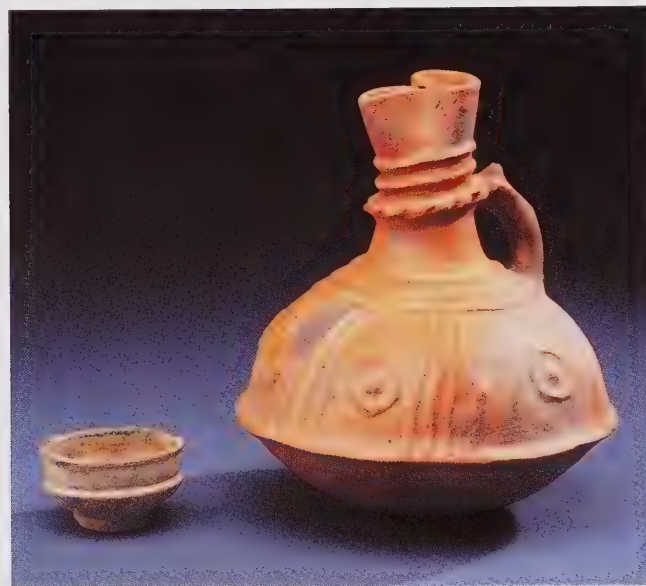
it. We cannot clearly trace the origins of cannabis smoking in North Africa and Spain many centuries back.

But what about Asia? Popular perception today holds that the Golden Triangle (northern Thailand/Laos) is the home for all manner of mind-altering substances, such as cannabis and opium. Yet, here again, it was for their medicinal properties that these substances were first marketed by the Arabs through their trading networks and transplanted elsewhere for cultivation. Of course, the effective medicinal use of opium was just as likely to have caused addiction then



L996.10.1-4, 990.152.537, 973 X 85.44

Selection of tobacco water pipes. Left to right: Indian coconut and silver pipe, 18th century; pipe with hose made in India for export to Yemen, modern; village pipe, Yemen, modern pottery; Chinese pewter water pipe, 19th century.



Top: Coffee cup, 20th century, pottery workshop of Hays, Yemen, excavated by the ROM expedition, and traditional coffee pot, Yemen, modern. Bottom: Chinese opium pipe, tortoiseshell and pewter, 19th century.

The obvious substance is cannabis. Northern Africa has a well-earned reputation for growing good quality cannabis. The 1930s jazz-era parlance of "reefer" for a marijuana joint speaks clearly of a source in the Rif Mountains of northern Morocco. Yet cannabis is not native to Morocco, and we assume that it was the Arabs who brought the plant there when they occupied the territory under the banner of Islam in the early 8th century. The Arabs themselves used hemp both as a fibre and as a medicine or pain killer in the form of hashish, consumed as a paste. There is no evidence that they smoked

as its recreational use does today. The Mughal Emperor Humayun (1530–1556) was a notorious opium addict.

In India, although there is almost ubiquitous evidence of various smoking devices dating to the 17th century and later, we have no such tangible proofs that people there smoked opium before the Dutch first introduced the habit in the mid-1600s. Confronted with a huge trade deficit because of the cost of buying camphor in Taiwan, the Dutch sought to lessen the drain on their silver reserves by promoting a previously untried trade item in the international market. They devised a way of shipping opium from Java

TOP: PRIVATE COLLECTION, E. KEALL, 990.152.290. BOTTOM: 934.71.3 GIFT OF MRS. JOHNSON AND MISS MACLAREN / PHOTO: BRIAN BOYLE, ROM

and introduced it first to the Taiwanese—suggesting that it be mixed with tobacco. (Prior to the advent of tobacco smoking, opium would have been consumed as a paste or drunk in the form of a tea.) The measure was an instant success. Opium-laced tobacco became the new fashion. The habit soon became popular on mainland China, too.

Ironically, it was the Chinese government's ban on to-

Nicot and the Arrival of Tobacco in Europe

Almost everyone remembers learning in grade school that tobacco came from the New World and was introduced into Europe in the 15th and early 16th centuries by Spanish conquistadores returning from the Americas. The first botanical specimens of tobacco plants were indeed brought back to Portugal by the Spanish in the 1540s. This was a wild species (*Nicotiana rustica*) with a strong bitter taste. But it had remarkable medicinal properties—it healed wounds, for instance.

Ironically, the name nicotine is derived from these healing properties. That's because the discovery of tobacco is not credited to the Spanish explorers as it should have been, but to Jean Nicot, who was the French ambassador in Lisbon. Nicot sent tobacco back home to Paris as a medicinal commodity, falsely earning the dubious honour of having introduced the evil weed to Europe. The domesticated, milder variety of tobacco (*Nicotiana tabacum*) was soon imported to Europe and by the 1580s tobacco smoking was widespread.

Another obscure, yet archaeologically attested, reality is that traces of nicotine have been recorded in Europe in the bones of skeletons dating to the Bronze Age (1st millennium BCE). The most likely explanation is that some variety of wild tobacco did exist in Europe at that ancient time before becoming extinct with changing environmental conditions. (It does not speak of pre-Columbus contact with the New World.)

bacco in 1641—in an attempt to reduce addiction—that precipitated the creation of the famous pipe for the smoking of pure opium. Tobacco pipes were unsuitable: when opium burns, it evaporates extremely rapidly. The opium pipe prevented the hallucinogenic properties of the drug from dissipating in the air before their effects could be felt. The pipe looks a bit like a flute, long and slender, with a hole for the inhalation and a separate flask for the flame. A flame is held close to a pellet of opium, but not touching it. The heat causes the opium to vaporize, without burning, so the fumes can be drawn into the pipe and inhaled by the user.

In Thailand, additional archaeological evidence for the

smoking of a substance before the era of tobacco has recently come to light. During the 1980s, ancient graves were accidentally exposed during road-construction work in the northwestern part of the country. The burials are attributed to a population that was obliterated when the Burmese invaded the area around 1550.

Among burial goods placed in the graves of these now-extinct people were ceramic smoking pipes. Curiously, the decoration on these pipes is not typical of a pottery prototype. The designs look more like the kind of details that would be produced if making an object in metal. Given the long-standing reputation of the Burmese for metal making, the initial conclusion is that the origin of this type of pipe should be sought in the nearby Myanmar Republic (Burma). Cannabis would seem to be the most likely substance smoked because hemp is native to this Asian region.

If we look at manuscript illustrations, the clues there about the practice of smoking before the 17th century seem to corroborate the idea that it was little known in Islamic realms before 1600. Water pipes in illustrated scenes after 1650 are extremely common; before that they never appear. But does this mean that they did not exist? Is it conceivable that it was a habit practiced in private, perhaps even by women, and not judged appropriate for formal, largely public events?

Archaeological scrutiny is hampered by the fact that in Arabic the word for smoking is the same as the word for drinking. The common sense is "inhaling." So even if we have a text that speaks of inhaling something, we can't be sure whether it refers to drinking or smoking.

One clue about the history of smoking is the name for the water pipe, known in English initially as the "hubble-bubble," because of the characteristic sound of the smoke-filled air being drawn through the water into the smoker's mouth. It's the contraption the caterpillar in Alice-in-Wonderland is generally depicted smoking. These days, such a pipe is usually called a shishah, which simply refers to the glass flask that contains the water. But significantly, two names attributed to this kind of pipe from different Middle Eastern languages—the Turkish *narghile* and the Yemeni *mada'ah*—mean coconut. A coconut, in fact, makes an ideal water container. It's logical to speculate, therefore, that this practice originated where the coconut was native—the Indian subcontinent. We may further speculate how the idea of using a coconut vessel for smoking may have spread to neighbouring Persia (Iran).

Persian manuscript illustrations dating to around 1640 indeed do depict people holding water-cooled smoking devices. The water vessel is tiny by comparison with what emerged later as the shishah. In Persian manuscript illustrations, the water vessel fits into the palm of the hand. On top of the vessel is a bowl about the size of an egg cup that holds the substance to be smoked. Did the Persians really invent the water pipe less than 50 years after the arrival of tobacco? Or did they smoke something before that?

We know that for smoking purposes, the Persians adapted a special kind of water vessel from the Far East. The ce-

ramic flask, or bottle—known in the collectors' world as a *kendi*—has an opening on the side below the neck and was very much part of the Buddhist culture of 7th-century India, associated with the ritual drinking of holy water. The hole in its side allowed water to be poured as a stream into a person's mouth, without having the lips touch the bottle. Despite its origin as a sacred vessel, the *kendi* was adapted by the Persians as an ideal base for a water pipe. A reed was simply inserted into the existing hole.

Before the more convenient *kendi* form was adopted, the Persians used flasks as water pipes. A particularly significant flask in the collections of Edinburgh's Royal Scottish Museum and made in Iran dates to the year 1550, and is decorated with the image of a cannabis leaf. Somehow, then, people must have smoked cannabis in a water pipe sometime before they were exposed to tobacco smoking.

After all, the Zulus of South Africa also traditionally smoke hashish water pipes. The substance carrier is not unlike the egg-cup-sized container seen in both the Turkish-period finds from Yemen and the Persian manuscript illustrations. With Zulu pipes, the water carrier is a cow's horn. But several factors argue against the use of this device from ancient times. First, the Zulus entered South Africa only in relatively recent centuries, as part of a major Bantu migration from the northwest, displacing the native Bushmen. More significantly, cannabis is not native to Africa. As was the case in Morocco, cannabis is likely to have been transplanted there as a result of Arab trading activity on the edge of the Indian Ocean beginning in the 8th century. Furthermore, there is a strong chance that it was the Dutch, again, when they first appeared on the shores of the southern Cape in the 1660s, who introduced the Zulus to the smoking habit. So once again, our smoke trail to the past seems to fizzle out.

Obscure as these leads are, one must be open to the idea that some people did smoke some substances in Asia in the centuries before the introduction of tobacco smoking by the Europeans in the 16th and 17th centuries. There is convincing evidence that mind-altering substances were inhaled long before tobacco.

As for written evidence, without question the most famous reference is from the "Father of History," 5th-century-BCE Greek historian Herodotus, who describes how the Scythians of Asia used to throw hemp (i.e., cannabis) onto hot rocks, put their heads under a blanket to inhale the fumes, and howl with laughter. We may take his commentary seriously, even though we must be cautious about accepting every detail since he never saw the indulgence itself but only reported the words of others. This caution is especially valid since Herodotus speaks of seeds being thrown onto the fire. With cannabis smoking, seeds are generally avoided; it is the flower head that delivers the desired effect.

Since hemp was a plant grown widely as a fibrous material for rope- and fabric-making in all of Asia, it is inconceivable that its mind-altering properties when burnt were not also

known. Yet, curiously, archaeologists do not find paraphernalia from this time that can be explicitly associated with substance smoking. No bowls with reeds attached have ever come to light. There are few manufactured utensils attesting to the use of cannabis. Seemingly, the blanket worked well enough.

In time, however, convincing evidence that such items existed before the introduction of tobacco may eventually be un-

Getting to the Roots of Java

In Yemen, the practice of coffee drinking began towards the end of the 15th century, before the Ottoman Empire occupied the country. The coffee plant was originally native to southern Ethiopia, though apparently it was not used there for making a beverage before the 16th century. Cow herders regarded it as a noxious weed because cattle refused to eat it. The idea that shepherds learned of coffee's potency by watching goats get frisky from nibbling on coffee berries seems to be largely a romantic myth promoted by the modern coffee industry. Still, it is inconceivable that nobody knew about the buzz to be had from chewing coffee berries.

The habit of using the berries for producing a beverage actually seems to have started with Yemeni mystics who presumably appreciated coffee's stimulating properties for their lengthy nighttime sessions of meditation. A text speaks of a mystic returning to Yemen from Ethiopia and deciding to brew some coffee berries when he got sick, some years before 1470, which is when he finally died. After having been exclusively a habit of mystics for some time, the practice of coffee drinking spread to Yemeni merchant communities abroad. By 1550, the habit had reached Cairo and Damascus (like Yemen, part of occupied Ottoman territory).

earthed. What seems likely is that people have long known about the smoking of substances. After all, the observations of the renowned 1st-century-CE Roman natural historian Pliny, who recommends henbane as a remedy for a bad cough, seem plausible. A seed of henbane was to be coated in wax and placed on a hot coal, and the smoke inhaled. It is significant that Pliny also recommends a draught of raisin wine to counteract the harshness of the smoke. This answers the question of whether or not people smoked before tobacco's appearance. They did smoke—for medicinal reasons. And like the cough medicine advertisement says, it tasted bad but it worked.

So although we must be cautious about placing too much trust in written testimony, it seems plausible that substance smoking was known in the ancient world. When good quality Virginia tobacco hit the Old World, whether they smoked it dry or wet, people clearly already knew how to use it. ■



italian
ARTS&DESIGN
THE 20TH CENTURY

This exhibition was produced by the Montreal Museum of Fine Arts (MMFA) in collaboration with the Royal Ontario Museum (ROM) and the Museo Mart (Museo d'Arte Moderna e Contemporanea di Trento e Rovereto), Rovereto, Italy.
¹ Massimo Fattori, *Dress, Delphos*, circa 1910-1920 (© ROM, 2006). 2. Joe (Cesare) Colombo, *Tube Chair*, circa 1969-1970, The Metropolitan Museum of Art, Theodore R. Gable Jr. Gift, in honour of his mother, Mrs. Theodore Robert Gable, 1987. Photo credit: The Metropolitan Museum of Art, New York.

SEAS, ISLANDS, STARS

FEATURE REVIEW

Egypt's Sunken Treasures*Franck Goddio, Manfred Clauss, eds.**(Prestel, Cloth: \$72.95)*

INTERNATIONAL FASCINATION with ancient Egypt persists and in this work converges on the antiquities recovered off the coast of the modern city of Alexandria by French marine archaeologist Franck Goddio. Relegated to the sea by various natural disasters over the centuries, the artifacts, which date from the 7th century BCE to the 8th century CE, have decorated the seabed unseen, as if ornament for a mythological underwater realm. The finds are the fruit of ten years' labour by Goddio and colleagues and were retrieved from the ocean floor by a combination of toil and sophisticated technology.

The treasures were exhibited in the Martin-Gropius-Bau, at the Berlin Museum, Germany, from May to September of 2006. Turnout was heavy, not surprising in view of traditional German interest in ancient Egypt—in 2005 alone, a million Germans visited Egypt in search of ancient cultural shrines. The exhibition will reappear at the Grand Palais in Paris, France, from December 2006 to March 2007.

In addition to Alexandria, two lost ancient cities are represented by the antiquities: Herakleion and East Canopus. Until their recent discovery, the cities were known only through lore and literature. Both were situated east of Alexandria at the mouth of the now-extinct Canopic branch of the Nile. Their remnant ecclesiastical architecture and religious statuary suggests that they were pilgrimage destinations. They disappeared mysteriously in the 8th century CE.

The excavations are documented visually through re-

markable underwater photography. Many of the images are of a dreamlike quality—a school of fish—mostly white seabreams (*Diplodus sargus*)—swims toward and past the head of a sphinx; a colossal Ptolemaic king, five metres tall, in pink granite, reclines on the seabed, as if in a slumber of two millennia; the sculpted face of Sarapis, a fertility god, gazes toward the surface light; bathed in the lamp-lights of approaching divers, a robed goddess in black granite, likely Cleopatra III assimilated to Isis, awaits

transport to a terrestrial afterlife; a 210-centimetre-high stele from the 4th century BCE exhibits its hieroglyphs, unread for centuries in the depths; a Ptolemaic queen, in black granite, emerges from the waves, her diaphanous garment glistening in the intense sunlight.

A diverse array of artifacts is represented: architectural fragments, agricultural tools, coins (in bronze, gold, and lead), ceramics, helmets and spears, incense burners, oil lamps, mirrors, miniature bronze statues, and bronze utensils. The black granite *Naos of the Decades*, from the 4th century BCE, incorpo-

rates hieroglyphic information of both astrological and astronomical significance.

Perhaps the most localized divinity encountered is the river god of the Nile, here sculpted in a greywacke (sandstone) bust from the 2nd century CE, idealized in the classical style.

Glen Ellis is head of Publications, Royal Ontario Museum. Milica Marich, a former ROM intern, is an archaeology student at Victoria College, University of Toronto. She is currently working as a researcher on the forthcoming On the High Road: The History of Godin Tepe, Iran, to be co-published by the ROM and Mazda Publishers in 2007.



REVIEWED BY GLEN ELLIS AND MILICA MARICH

At the Ojibway: 100 Summers on Georgian Bay

David Macfarlane

Foreword by Hon. Hilary M. Weston

(Nancy Lang, Cloth: \$69.95)

SET IN ONTARIO'S Thirty Thousand Islands, this exquisite work is a treasure for anyone who has known what the author calls "the beauty and bittersweet brevity of a northern summer." Sepia snapshots and hand-tinted postcards, bronze ink in a crumbling diary, evocative text, brilliant new photography, and superb book design and production conjure the magic of place and time. The Ojibway referred to in the title is the hotel built on Ojibway Island in 1906 by the enterprising Hamilton Davis and managed under his watchful eye for the next 40 years. The book's landscape format ably serves as a canvas for this jewel in the northern crown of islands, the Ontario Archipelago.

The hotel and island took their name from the popular Longfellow poem *Hiawatha*, which had celebrated the native North American living in harmony with na-

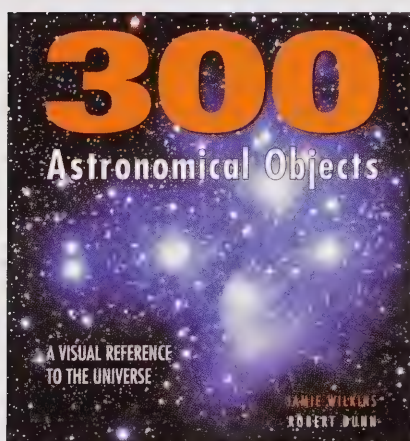
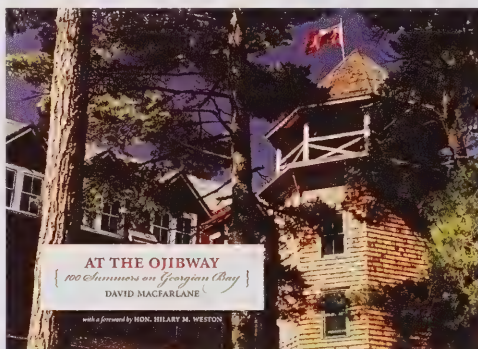
ture. The hotel's logo (also the colophon for the book) was adapted from a 1902 postcard image of Hiawatha's father-in-law, Arrowmaker. The graphic was used on hotel china as well.

Built in the rustic style perhaps best known from the Adirondack lodges of the early 20th century, the hotel attracted its clientele from cities in southern Ontario and the northern US. Most important in terms of its survival was the social interaction between Ojibway guests

and the cottagers of the Georgian Bay islands near Pointe au Baril (the place name of which derives from an improvised whiskey-barrel lighthouse that had guided *voyageurs*). The islanders were invited to the annual regattas (which they invariably won) and it was the islanders who would, on the eve of the building's centennial, raise the several millions of dollars required for its restoration.

Today it serves not as a hotel but as the centre for the Pointe au Baril Island community.

A scrapbook of memory, *At the Ojibway* is a tribute to the living past, the continuity of experience across generations, a communion of people, place, and architecture.



300 Astronomical Objects: A Visual Reference to the Universe

Jamie Wilkins, Robert Dunn

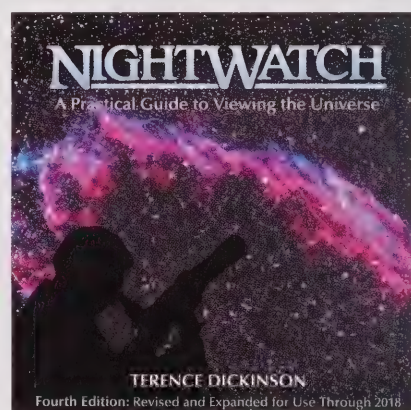
(Firefly, Cloth: \$29.95)

THE RECENT EXPULSION of Pluto from the planetary pack surprised lay people around the world but apparently not most astronomers.

Published early in 2006, *300 Astronomical Objects* classifies Pluto as a Kuiper Belt Object (KBO). An alternative classification ("or planet") is also included. Another entry notes that "Pluto is on the verge of being reclassified as a KBO, along with its moon Charon." The Kuiper Belt is a region of "ice balls" at the edge of the solar system. The objects are ancient, flung from the solar system as it was forming.

A field guide to the universe, *300* begins with a capsule illustrated history of astronomy and ranges, ever outward, through the solar system and Milky Way to other galaxies and beyond. Authoritative and current, the book is also a visual delight, the astronomical photography drawn from the best international sources, as evidenced from the picture credits.

Another new Firefly release, the fourth edition of Terence Dickinson's



NightWatch: A Practical Guide to Viewing the Universe (Cloth, \$35) has been revised and expanded for use through 2018. In addition to the updated star charts for the northern hemisphere, charts for the southern hemisphere are included for the first time. The new edition also features an equipment update and a section on digital cameras for astrophotography.

CONSERVATION NOTES

RESTORING THE ROM'S FUHRLOHG / BECK PIANO

Made by a cabinetmaker to the Prince of Wales, this remarkable piece of furniture embodies the best in instrument-making and fine marquetry.



BRIAN BOYLE, ROM / 2002.23.1

IN THE NEOCLASSICAL SECTION of the Samuel European Galleries' south wing stands one of the most important pieces of English furniture in North America. An extremely rare and exceptionally crafted satinwood marquetry piano, it was made in 1777 by Swedish cabinetmaker Christopher Fuhrlohg and German instrument-maker Frederick Beck. We can only imagine the resplendent drawing-room in which it was first played, as the piano's original owner is unknown. What we can trace is the history of the piano's makers, its 20th-century jour-

ney from a noted English antique dealer to the Royal Ontario Museum, and the restoration of its cabinetry to its original glory.

In 1762, Christopher Fuhrlohg (1737–c. 1800) left his native Sweden for Amsterdam. Two years later, he journeyed to Paris, where he is thought to have worked for Simon Oeben, brother of the famed *ébéniste* (French

GREG KELLEY

cabinetmaker) Jean-François Oeben, who had been cabinetmaker to Louis

The ROM's Fuhrlohg/Beck piano is a masterpiece of neoclassical marquetry

XV. By 1767, Fuhrlohg had made his way to London, where he joined a growing colony of Swedish artisans. He brought with him the latest neoclassical designs and the most up-to-date techniques for cabinetmaking and marquetry.

Marquetry is the use of veneers of different timbers and colours to create pictures in wood. For cabinetmaking, veneer is often preferred to solid wood because of the beautiful decorative effects that can be achieved with marquetry. A high level of skill is needed to execute it well. The art reached

its zenith in mid-18th-century Paris. The Fuhrloh/Beck piano, combining pre-eminent craftsmanship with a purity of neo-classical design, is a masterpiece of marquetry.

Fuhrloh must have had exceptional skills; in London he found employment with the eminent cabinetmaker John Linnell. By 1774, Fuhrloh had his own workshop at No. 24 Tottenham Court Road, where he produced complete cabinetry as well as marquetry panels in the latest neoclassical taste. Around 1783, he was appointed cabinetmaker to the Prince of Wales (later to become George IV).

Frederick Beck (active in London 1771–1798) was one of the “Twelve Apostles,” a group of exceptional musical instrument makers who fled Germany for London during the Seven Years’ War (1756–1763). Some of the best instruments in the world—most notably square pianos, which debuted in London in 1766—were made by members of this group. Queen Charlotte, Marie Antoinette, and Catherine the Great were devoted patrons of these talented artisans.

The ROM’s Fuhrloh/Beck piano is remarkable not only for its rarity and exceptional craftsmanship, but also because the instrument is hidden in the form of a commode. Meant more for decoration than function, this type of grand chest of drawers or cabinet with legs is transformed into a piano by lifting the lid, removing the rectangular board concealing the keys, and retracting the front panel (decorated with the figure of a Muse) to accommodate the player’s legs.

Only one other example of a marquetry case by Fuhrloh is known to incorporate an instrument by Beck: an earlier piano dated 1775, owned by the famous collector Viscount Leverhulme and now in the Lady Lever Art Gallery in Port Sunlight, England. In 1921, Leverhulme purchased the ROM’s piano from noted London an-



BRIAN BOYLE, ROM / 2002.23.1

Top: The key feature of the marquetry, this Muse holding a lyre may have been borrowed from Swiss artist Angelica Kauffman.

Bottom: The piano’s instrument portion is revealed by retracting the commode’s front panel and lifting the lid.

tique dealer Frank Partridge; however, he returned the piano to Partridge’s shop after only one year, preferring the earlier Fuhrloh/Beck piano he had purchased.

The ROM’s piano remained in Frank Partridge’s private collection until after WWII. With currency controls in place in England after the war, many antique and art dealers opened branch shops in New York. The piano was one of the pieces sent there, and was sold in 1951 to Nelson and Eloise Davis of Toronto for their new home, Graydon Hall. In 2002, the ROM purchased the piano from the Davis Collection through the Louise Hawley Stone Charitable Trust with assistance from the Minister of Canadian Heritage.

A particularly exciting acquisition for the ROM, the piano embodies the best of neoclassical design and decora-

tion. When it was new, the iridescent buttery yellow of its West Indian satinwood case, its colourful marquetry panels depicting urns and floral scrolls, and its glistening gilded bronze mounts of acanthus leaves and rams’ heads would have made quite a statement in one of the finest of English drawing-rooms. Over time, the veneers of satinwood, amaranth (purple-wood), harewood (sycamore that would probably have been dyed grey to look like silk), tulipwood (pink-and-cream striped like candy cane), rosewood, holly, ebony, and boxwood have faded to gentle shades of golden yellow and brown. The marquetry was laid on a ground of pine. Usually with marquetry of this calibre, oak is the typical base wood, but since Fuhrloh was Swedish-trained he preferred Baltic pine or spruce.

One of the most outstanding features of the marquetry decoration is the front panel. A realistic figure of a Muse holding a lyre looks like a painting in wood and is in the distinctive style of a drawing by Swiss artist Angelica Kauffman, also resident in London and the first female accepted to the British Royal Academy. As there are no known engravings of Kauffman’s Muse, it is possible that Fuhrloh had access to the original drawing. The collaboration between Fuhrloh and Beck, with Kauffman’s Muse as the inspiration for the front marquetry panel, suggests close relationships within the community of foreign artists and artisans working in 18th-century London.

When the ROM acquired the piano, it was in relatively good condition. However, the sound board was cracked, so it could no longer be played. There were cracks in the sides of the case, areas of lifting veneer, and a few losses of timber in the marquetry decoration. Much of this damage was due to poor humidity control. Furniture that has survived with little change for hundreds of years in the relatively stable

English climate needs only one winter in Canada or the northern U.S. without proper humidity to develop a whole host of problems.

Three years after the ROM acquired the piano, I was hired to repair the damage to the case. A great deal of the value and beauty in an antique is in its untouched aged surface. The effects of light, gentle wear and tear, and the accumulation of dust and waxes create a richness of colour and texture. This patination needs to be protected when conserving an object. Before work began, the surface of the piano was "alienated," or protected with a barrier material, in this case a generous coat of clear wax.

Time and research are needed to decide on the best course of treatment for any piece undergoing conservation. Once the funds were found to carry out the conservation work—money and staff for furniture conservation are not part of the regular ROM budget—it took four months to conserve the piano. I reglued the lifting

veneer with traditional hide glue (warm animal glue). I replaced losses to the colourful marquetry using veneers of the same types of timber. These small pieces were made to fit, like pieces of a jigsaw puzzle. Up to 60 coats of shellac were carefully brushed on to the new pieces to ensure they blended with the full-grained finish of the surrounding polished surface.

Unfortunately, a crack is a crack. When relative humidity drops below 30 percent, wood can crack. When relative humidity is too high, swelling can also cause permanent damage. The only successful way to deal with a crack is to camouflage it. I filled the large cracks with balsa wood and pigmented wax.

The gilt mounts (ormolu) were probably made in England as part of an expensive custom design. Sometime in the past, a coat of brown shellac had been applied to disguise the loss of gilding. As part of this project I removed the shellac and re-gilded the naturalistic acanthus leaves, stylized rams' heads, and leather-wheeled cas-

tors with reversible materials—those that can easily be removed by later generations of conservators if necessary—restoring the mounts to a brilliant gold.

Once all the repairs were completed, the protective coating of clear wax was buffed off. The satinwood glowed and the marquetry decoration came to life.

An outstanding example of neo-classical design and workmanship, Christopher Fuhrloh and Frederick Beck's piano exhibits the talents of two of the greatest artisans working in 18th-century London. Few examples of furniture anywhere in the world, let alone North America, are as fine as this one. With any luck, future study will reveal who originally owned the piano and where it may have been during the first 150 years of its life. Until then we have to let our imagination do the playing.

Greg Kelley, who does contract work for the ROM, is a private furniture conservator/restorer in Toronto.

One Bedford
AT BLOOR

MODEL SUITE CONTENTS AUCTION

As Exhibit Patron of *Italian Arts & Design: The 20th Century*, and in preparation for demolition of the One Bedford presentation centre and model suite, we are pleased to announce that the extraordinary furnishings, beautiful artwork and fine fittings are up for auction to help support our commitment to the Royal Ontario Museum*. Visit us and view this exceptional grouping of items highlighted by signature pieces by Barbara Barry. Bidding begins at 6pm, November 30th, and closes at 8pm.

DATE: Thursday, November 30th, 2006
TIME: 6:00 to 9:00pm

History is about to be made on Bloor Street as the incredible One Bedford is about to begin construction. Artisans, carpenters and visionaries have combined to create the sleek steel and glass structure that will change Toronto's skyline for eternity. Now is the perfect time for you to discover One Bedford, still available at pre-construction prices. Live the life extraordinaire, at One Bedford. EXQUISITE CONDOMINIUMS FROM THE \$300'S TO OVER 2 MILLION.

Call 416.962.6639 or onebedford.com

* Proceeds of the auction will in part be used in contribution to the ROM in respect of our sponsorship of the *Italian Arts & Design: The 20th Century* exhibition.

italian
ARTS & DESIGN
AT THE ROM

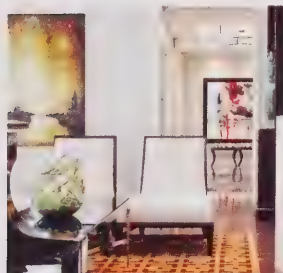
Royal Ontario
Museum

LAN TERRA
DEVELOPMENTS

THE BEDFORD PARTNERS

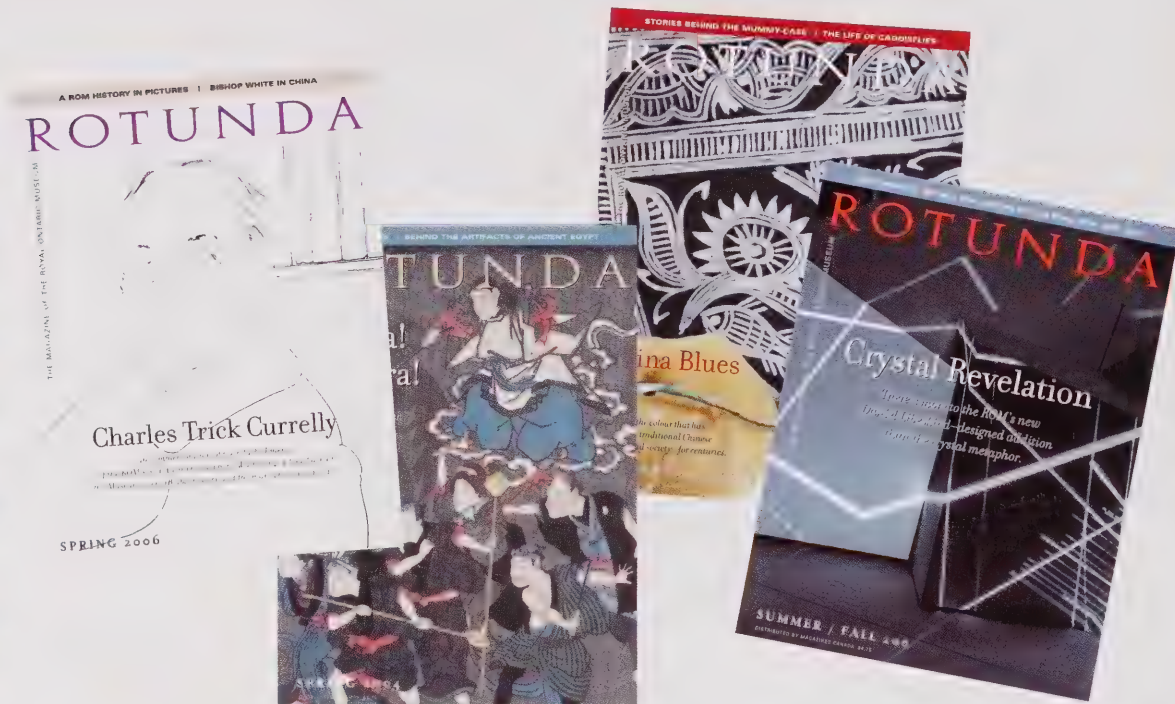


Pre-construction sales:
Monday - Thursday 10am - 6pm
Friday - Saturday 10am - 5pm
Sunday 12pm - 5pm



GIVE A GIFT OF WONDER

ROTUNDA



SEND ROTUNDA TO A FRIEND

Give a year of Rotunda and you're giving a gift of excitement and exploration, perfect for that friend with a passion for collecting, a curious cousin, or that hard-to-buy-for history buff in your life.

With everything from ancient civilizations to scientific breakthroughs, Rotunda brings to life a world of discovery. Our writers will take your friends and family with them as they solve ancient mysteries, look in depth at the wonders of nature, tackle the tough questions of conservation and ecology, and examine the arts of humankind throughout the ages.

For just \$15 (including GST) you can give three colourful, illuminating issues. It's a gift that keeps giving all year long. Wrap up your shopping for the season by subscribing now. The first issue will arrive in February 2007.

THE MAGAZINE OF THE ROMAN MUSEUM

CRACKING THE CASE

Once thought to be fossils of ancient worms, curious structures such as the one on this piece of fieldstone have an origin that lies beneath the mud.

Dear Dave:

A FARMER of my acquaintance in Markham knew I was interested in fossils and asked me to come over and look at a fieldstone he found on his property several years ago. I am attaching some photos of the specimen. It's a small block of what appears to be medium-grained sandstone with clear layering, but lacks any shelly fossil remains. There are some odd markings on the surface and my closest guess is that these are syneresis features (underwater contraction "cracks"), although I've never run across such things showing a circular pattern like this. What would be your suggestion, based on the photos?

Looking forward to hearing from you and to solving this little mystery!

MARTIN LEGEMAATE

Dear Martin:

IT'S GOOD TO HEAR from you again—thank you very much for the photos and description of Mr. Reesor's fieldstone phenomenon.

Congratulations. You are pretty much dead-on in your interpretation of these curious structures! They do indeed represent shrinkage or contraction features formed through the drying and cracking of mud and sand deposits along the shallow margin of an ancient sea. Most of us will have seen the modern versions: familiar polygonal or sinuous cracking patterns in mud around drying ponds or puddles.

The formation of the strange curlicue structure seen in the fieldstone sample, however, requires several additional steps, including burial of the desiccation-



MARTIN LEGEMAATE USED WITH PERMISSION

Mr. Reesor's fieldstone specimen.

cracked surface beneath layers of coarse, wet, sand-sized particles. As the sand is injected into the openings, it forms a thick, heavy, blanket overlying the mud. This creates sand "casts" of the cracks. Most of the original fine mud particles are fluidized and squeezed out with ongoing compaction as more wet sediment layers are added from above. When the whole package is cemented to-

DAVE RUDKIN

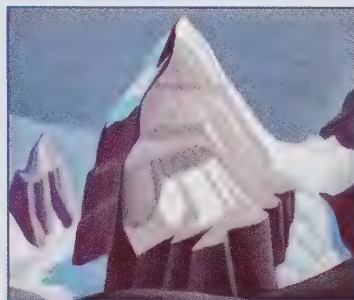
gether and transformed into sandstone over lengthy periods of time, the only remaining vestiges of the

cracks are the distorted and superimposed casts of the cracks. Ta dah!

Although this sounds like a fairly straightforward process, it actually took considerable effort by sedimentary geologists and paleontologists to interpret the rock unit in which Mr. Reesor's specimen is embedded. First we had to determine the fieldstone sample's original geological context. The tough block of quartzite (a sandstone that has undergone further heating and pressure) is definitely not native to Markham, but comes from the Elliot Lake area of Ontario some 400 or 500 kilometres (250 or 300 miles) to the north and west. It almost certainly was picked up and carried there in the frozen lower layers of a flowing glacier

Heffel's

Vancouver • Toronto
Ottawa • Montreal



LAWREN STEWART HARRIS

Mount Lefroy

oil on board, circa 1929

12 x 15 in. 30.5 x 38.1 cm

Estimate: \$200,000 ~ 250,000

SOLD FOR: \$1,667,500

Record for a Group of Seven oil sketch
Record for a Lawren Harris oil sketch

Canada's national fine art auction house, Heffel's regularly conducts live auctions of *Fine Canadian Art* in Vancouver in the Spring and Toronto in the Fall, preceded by previews of their sales in Vancouver, Toronto and Montreal. We also conduct monthly Internet auctions of Canadian, European, Asian and American art.

Call one of our offices today for a free assessment of the current value of your fine art. Appraisals also undertaken for insurance and estate purposes.

Our experts can be contacted at any of the locations below or visit our website at

www.heffel.com

Ottawa office

Telephone: 613 230-6505

Toll Free: 866 747-6505

Heffel Gallery, Vancouver

Telephone: 604 732-6505

Toll Free: 800 528-9608

Galerie Heffel, Montreal

Telephone: 514 939-6505

Toll free: 866 939-6505

Heffel Gallery, Toronto

13 Hazelton Avenue

Toronto, Ontario M5R 2E1

Telephone: 416 961-6505

Toll Free: 866 961-6505

e-mail: mail@heffel.com



D. RUDKIN

Ancient desiccation cracks in Lower Silurian (about 440 million-year-old) lagoonal deposits of the Severn River Formation, Shamattawa River, Ontario.

during the last great Ice Age, between about 100,000 and 10,000 years ago.

Its ultimate origin, however, extends back at least 2 *billion* years, to the Paleoproterozoic Era of Precambrian time, when what is now the rugged Shield terrain of north-central Ontario was part of a smaller continental land mass bordered by an ancient sea. The Bar River Formation, from which our specimen is derived, formed from sandy, silty, and muddy sediments that were deposited in shallow waters at the edge of this sea. Occasionally, the sediments were exposed above high tide, where they dried out sufficiently to form cracked muddy layers, which were then inundated by wet sand, initiating the "sand-casting" process outlined above. I should point out here that there are two kinds of cracks—desiccation cracks, which form "subaerially" (literally, under



D. RUDKIN

Modern desiccation features in bacterial mats on a modern tidal flat at Houston Point, Akimiski Island, Nunavut.

air, or above the water line), and syneresis cracks, which form from quite different contraction or shrinkage processes that take place underwater. As far as we can tell, the Bar River Formation cracks originated through exposure and desiccation that occurred above water level.

An interesting twist to this tale is that the Bar River shrinkage-crack casts were originally—back in the 1960s—interpreted as fossil remains of worm-like animals, or traces of worm activity! Many of the structures do display a striking resemblance to modern segmented worms or worm-tubes, even down to the wrinkle-like corrugations that mimic a worm's annulations. A published account in the mid-1960s not only considered this organic origin a possibility, but even proposed a set of formal biological names for the structures:



Mr. George Reesor holding the specimen

Rhysonetron lahtii and *Rhysonetron byei*.

A major stumbling block for this interpretation was the age of the rocks; at over 2 billion years, these were more than a billion years older than the oldest accepted record of large, complex animal fossils. By the early 1970s, better specimens had been found and a much more satisfactory explanation of how the structures formed from desiccation cracks had been worked out. And that's where we stand today: from mud cracks along an ancient seashore to a glacial sleigh-ride that concludes in a Markham farm field. Mystery solved.

Thanks again, Martin, to you and Mr. Reesor for bringing us this crack-ing yarn.

Dave Rudkin is assistant curator in the Paleobiology Section of the ROM's Department of Natural History.

Ms. Emma Designs

Handcrafted Originals



87 Harbord Street
Toronto
416 323 8800

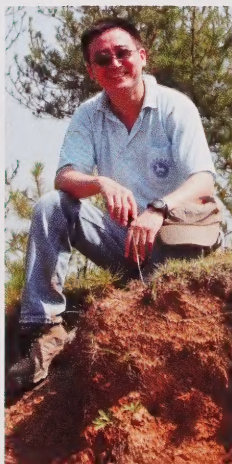
1967 Avenue Road
Toronto
416 488 4005

123 Laurier Ouest
Montreal
514 270 9123

Via Mazzini 69
Foligno, Italy
+39 0742 350505

COMING IN THE SPRING 2007 ISSUE

Ten years in China



ROM archeologist Dr. Chen Shen, who recently won a prestigious award from the Wenner-Gren Foundation for Archaeological Research, discusses his 10 years of research in China and his findings on its first peoples.

ROTUNDA

YEAR-END PARTY

'Twas the season in the old Far Eastern Library.



IN THE LATE 1970S, this photograph was snapped at a year-end party in the old Far Eastern Library's Heritage Wing location, hosted by the Bishop White Committee and Mrs. Louise Hawley Stone, who served as its chair.

Standing is Dr. J. Tuzo Wilson, then director of the Ontario Science Centre and best known for his theory of plate tectonics, speaking about his experiences in China. To his right is his daughter, Patty Proctor, and beside her is Jeanne Parker, both ROM curators in the Far Eastern Department. To his left sit Mrs. Stone, the ROM's single most generous benefactor, and Dr. Lewis C. Walmsley, former chair of U of T's Department of East Asian Studies as

well as biographer to Bishop White.

The decorations on the grand tables include one of Mrs. Stone's Chinese textiles, a pine branch, and a model of a Chinese village based on a Ming dynasty scroll painting of a Sung dynasty town. Mrs. Stone bought the village as a kit from the Metropolitan Museum in New

JACK HOWARD

York and asked Bishop White Committee members to assemble it. Today, it still graces the yearly seasonal party in the H. H. Mu Far Eastern Library, a tender reminder of the old days.

Jack Howard is librarian of the ROM's H. H. Mu Far Eastern Library.

PROUD PARTNER OF THE ROYAL ONTARIO MUSEUM



Located in the heart of downtown Toronto, we feature six restaurants/lounges, separate adult and family recreation facilities/pools, and an on-site ticketing department



with access to the city's hottest shows and events. Plus, Delta Chelsea guests save 20% off admission to the ROM, just by showing their key at the door!

Your room is ready

"Toronto's dining circuit has another winner in its ranks."

- Toronto Life Magazine

Join us for one of our sumptuous buffets.

Friday Evening Seafood Buffet: \$35

Saturday Italian Buffet: \$29

Sunday Evening Prime Rib: \$29

Sunday Brunch: \$29

(plus taxes & gratuities)



Reservations recommended. Please call 416-585-4319.

33 Gerrard St. W., at the Delta Chelsea. Complimentary parking available.





ALLURE

SURPRISE. SURPRISE. SURPRISE. NOT. Once again the Oshawa #2 plant, the home of the Allure has been awarded the gold plant quality award in North/South America by J.D. Power and Associates. The Allure is everything a Buick always has been, with the added brilliance of the newest and best in automotive thinking. Renowned Buick luxury, comfort and quality, together with Buick QuietTuning for unparalleled interior solitude, and superior craftsmanship everywhere the eye looks. It is this level of quality and excellence that you can expect to find in every other member of the Buick family along with the precision crafted Lucerne.



LUCERNE

buick.gmcanada.com



General Motors Corporation-Oshawa #2, Ontario Canada received the lowest number of problems per 100 vehicles for plants in North/South America that produce vehicles for the U.S. market in the proprietary J.D. Power and Associates 2005-2006 U.S. Initial Quality Study™. 2006 study based on responses from 63,607 U.S. new-vehicle owners, measuring 145 vehicle manufacturing plants and measures opinions after 90 days of ownership. 2006 proprietary study results are based on experiences and perceptions of owners surveyed in February-April 2006. Your experiences may vary. Visit jdpower.com.

